THE MICRO USER

Volume 3
Number 10
December 1985
£1.25

Top-selling guide to the BBC Micro!

R C M S I T B T T
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C M O S I L P W E
A S C S H V X S A
A T R I H P O D
M J B A L J F E
P A B F D L A O U R
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TOOLKIT PLUS

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Toolkit, chosen by thousands of BBC users, has now been re-written.

- Full screen Basic editor (Wordwise-like in use). Fully integrated and works in any mode
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Don't bother re-writing routines that have already been professionally coded.

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- Over 20 new commands

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Sleuth	Murom
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Dumpmaster	

WORDEASE

Disc
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Rom
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The Wordwise Plus utility disc

Adds new features such as Mail merging, Label printing, Copy (or move) seg. to seg., Auto-version no. save, Auto-printer codes, Programming Utilities, Auto-section renumber . . . and much more, to your Wordwise Plus.

- Menu driven & easy to use
- As approved by Computer Concepts

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Supplied on 16K Rom it allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

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Please add 50p post & packing.

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Bucks, HP10 8NP

Access and Barclaycard
24 hour hotline
PENN (049481) 6666

Further Information
Telephone St. Albans (0727) 40303

SPELLCHECK III

Rom
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SPELLCHECK III from Beebugsoft

Rom based spelling checker for Wordwise, Wordwise Plus & View

Now in 16K with 2000 words in Rom

Even faster. On test timings . . .
Watford 1.3 DFS 1620 wpm
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Comes with 6000 word dictionary disc.
Upgrades from Spellcheck.
Ask for details.

TOOLKIT PLUS

BASIC PROGRAMMING AID IN 16K ROM

A VERY SPECIAL PROGRAM

- Now in 16K
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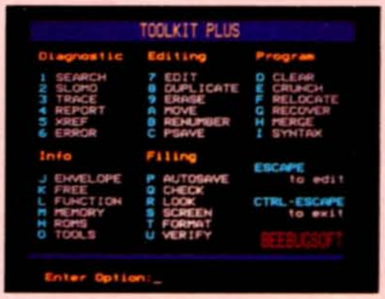
- A host of new commands
- Unique syntax checker
- "★command" or menu driven
- Toolkit upgrades available

In the two years since its launch Beebugsoft's Toolkit has been chosen by many thousands of BBC users and established a reputation second to none. The launch of our new second-generation Toolkit is therefore something rather special.



```
                 TOOLKIT PLUS

Diagnostic      Editing         Program

1 SEARCH        7 EDIT          D CLEAR
2 SLOMO         8 DUPLICATE     E CRUNCH
3 TRACE         9 ERASE         F RELOCATE
4 REPORT        A MOVE          G RECOVER
5 XREF          B RENUMBER      H MERGE
6 ERROR         C PSAVE         I SYNTAX

Info            Filing
                                ESCAPE
J ENVELOPE      P AUTOSAVE          to edit
K FREE          Q CHECK
L FUNCTION      R LOOK          CTRL-ESCAPE
M MEMORY        S SCREEN            to exit
N ROMS          T FORMAT
O TOOLS         U VERIFY        BEEBUGSOFT

Enter Option:_
```

Toolkit Plus is a 16K Rom which has been written from scratch making use of the latest programming techniques. It offers over 40 commands (grouped for ease of use) and some new and very exciting features, all of which may be called directly or from a menu.

TWO SPECIAL FEATURES

1 **Syntax Checker.** The first of its kind on the BBC. As you key in your program, Toolkit will draw your attention to syntax errors that may otherwise come to light only after many program runs. You may also pass complete programs through the checker.

2 **Basic Editor.** A fully integrated full screen editor, comparable with Acorn's stand-alone Basic Editor, using 'single key' commands for Move, Delete, Search etc all from within the on-screen editor.

OTHER COMMANDS

Autosave	Save programs at the press of a key
Psave	Partsave any program section
Xref	Powerful cross referencer to display values of variables, arrays, fns, procs, etc and their line numbers
Format	Flexible disc formatter
Slomo	Program speed controller
Roms	Display & enable/disable Roms
Crunch	Amazing Basic program packer. Beats the rest. (Removed 4,500 bytes from original Masterfile II)
Search	Flexible search & replace with 4 wildcards & special options (eg ignore spaces, Rems, case etc). Integrated with editor
Trace	Output to window with single step options
Error	Auto error detection
Check	Compare memory with disc/tape
Function	Function key editor
Envelope	Envelope display
Clear	Clear all variables
Free	Memory status info.
Duplicate	Copy program lines
Erase	Delete program lines
Move	Move program lines
Look	List file directly from disc/tape
Renumber	Flexible renumber
Memory	Hex and Ascii memory display
Merge	Combine 2 programs
Relocate	Move program in memory
Recover	Recover 'Bad Program'
Report	Extended error reporting
Screen	Screen save
Verify	Disc verify
Tools	Command summary
Menu	Toolkit menu

UPGRADE

Existing Toolkit owners may return their Rom and manual (mail order only) for a discount of **£13.50**

PRICE £39.00 inc. VAT. Available from your local dealer.

For further information: Tel St. Albans (0727) 40303

24 hour Access & Barclaycard hotline
Tel Penn (049481) 6666

Mail order to
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THE MICRO USER
Create your own word puzzles
Memory Dumper
Making spelling as easy as ABC

Vol. 3 No. 10 December 1985

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January-June 1985

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Read all about it. All the latest events in the ever changing world of your BBC Micro.

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Fancy Z80 or 68000 code on your BBC Micro? One of Crossware's latest products could simulate it.

110 ALPHABET TRAIN

Letter recognition and spelling made fun in this entertaining children's educational game.

115 McBASE

Need a database? You should look no further than our friendly and flexible record handler.

117 SQUARES

Recapture that end of term feeling with this version of the classic 'join the dots' game.

122 THE LIGHT PROGRAM

The enemy's down below, our mines will see him go. The final part of Al's master game.

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Acornsoft's 6502 Development Package is here at long last. But was it really worth the wait?

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Wondering what's happening to Acorn's DFSs? Get all the facts about the 1770 and ADFS.

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BATTLEFIELDS
INCENTIVE
CONFUZION
BOFFIN

Christmas Software Guide

Our fearless reviewers present their detailed evaluation of some of the recent releases just ready for the Christmas market.

–Page 79

FREE ENTRY COMPETITION 6 NIGHTS IN NEW YORK

Nightingale *The Modem*

NIGHTINGALE
by Pace
modem connect
carrier detect
line hold
power data
TX1200 RX75
RX1200 TX75
originate
answer
Viewdata
300 Baud
CCITT (Euro)
Bell (USA)

The facts speak for themselves, **Nightingale** is without equal in its field. It is undoubtedly the most popular multi baud rate modem available today. Whatever your communication requirements, the simplicity of use and the versatility of **Nightingale** will enable you to provide a solution whether the need is to extract information from Prestel, send telex's via Telecom Gold, download telesoftware or exchange files, **Nightingale** will do the job and a whole lot more besides.

Nightingale operates at the two most popular baud rates 1200/75 as used by both private and public viewdata systems and 300/300 baud for communication with remote mainframe, mini or micro systems. Also available in 'reverse viewdata mode' 75/1200.

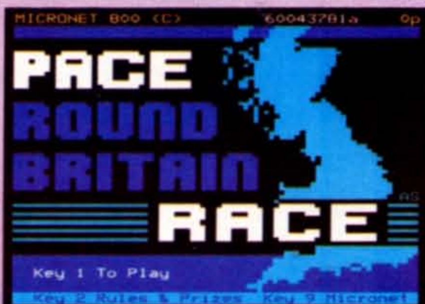
Nightingale has passed the very rigorous tests required by the BABT and is fully approved for use in the UK. This not only means that you can rely upon the safety of the product because of the stringent manufacturing constraints, but also means that because it is a BABT approved product, you can be assured that your application to Telecom Gold, Prestel etc., will not be refused.

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

Commstar *The Software*

A fitting partner for the Nightingale modem, **Commstar** was nominated for the 1985 British Microcomputing awards, a remarkable achievement considering the very recent awareness of the true versatility of communications via the computer. With its powerful combination of Viewdata and ASCII terminal capabilities contained in one 8K Eprom, **Commstar** is probably the only communications Software you will ever need, as its many thousands of users will testify. Although it is unusually versatile, it is extremely easy to use as full advantage is made of the BBC's function keys and a comprehensive manual describes each of **Commstar's** features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are now available.

The Competition



MICRONET 800 (C) 600437B1a 0p

PACE
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BRITAIN
RACE

Key 1 To Play
Key 2 Rules & Prizes Key 9 Micronet

Pace have linked with the premier computer information provider on Prestel, MICRONET and Virgin Atlantic Airlines, all pioneers in their own fields, to offer you a challenge. A chance to try out your skills using your modem and play the 'Pace round Britain Quiz' on Micronet, and in so doing, an opportunity to win a fabulous holiday for two in New York.

This competition will be open to you between November 1st and February 1st if you buy one of our modems before the end of January. In addition, you will be given, free of charge, a full quarters subscription to MICRONET worth £10, and free registration to Microlink on Telecom Gold.

The prize includes a return flight to New York, 6 nights accommodation in a high quality New York Hotel, and spending money to the total value of £400.

Full details are contained with each modem.

micronet 800

Virgin atlantic

Nightingale Modem £119 plus VAT; Commstar Software £29.57 plus VAT; combination package £139 plus VAT

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The products and information are available from good quality dealers throughout the country or direct from Pace. Payment accepted by cheque, Access or Visa.

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INFORMATION PROCESSING ON YOUR BBC COMPUTER!

WHY SHOULD THE BIG BOYS GET ALL THE INTEGRATED SOFTWARE?

For serious users of the BBC computer. Disc machines only.

What the reviewers say:-

DATASCRIBE IS BRILLIANT VALUE FOR MONEY—

John Vogler, A & B Computing, Sept 1985.

I SHALL USE SCRIBE FOR MOST OF MY WRITING—

John Dawson, Your Computer, Feb 1985.

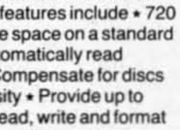
SCRIBE £59.95

THE PROFESSIONAL WORD PROCESSOR designed for the serious user • All operations fully prompted • No special knowledge of the computer system necessary • Document size NOT limited by computer memory • Automatic disc buffering ensures text is moved between disc and computer memory without user intervention • Up to 255 pages in a single document • 80 column display • On screen underline and right justify • See it as it will be printed. SCRIBE comes in a chip with 5 minute fitting instructions, utilities disc and manual. Integrates with Database.

DATABASE £49.95

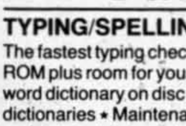
A superb record keeping system with an incredible operating speed. 96 fields per record • One record 2 Kb max • One field 900 characters max • 4000 records per database • 16 level conditional search • Record match • 8 automatic sub indexes • Total flexibility of output via report writer with ability to write back to the database • Maths pack • Semi programming language plus compiler. Integrates with Scribe to give conditional search with MAIL MERGE and high powered report formatting. Comes in ROM.

DATASCRIBE £95



Scribe & Database in a single chip! Contains all the features of both products and with an attractive saving on price and ROM space.

DOUBLE-DOS £59.95



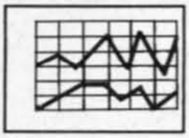
Double density disc interface. A high capacity database or word processor is enhanced even further with this state of the art disc interface. The many features include • 720 Kb of CONTINUOUS file space on a standard 80 track disc drive • Automatically read standard Acorn files • Compensate for discs formatted in single density • Provide up to 159 files IN ONE DIRECTORY • Automatically read, write and format double sided drives to appear as one disc surface • Allow maximum use of MERTEC Scribe and Database. Very easy fitting — no soldering — full instructions provided.

SCRIBECHEC £24.95

TYPING/SPELLING CHECKER.

The fastest typing checker available. • 7200 word base dictionary in ROM plus room for your own 15,000 (approx) word dictionary on disc • Any number of dictionaries • Maintenance includes add and delete, list words between alpha limits and many more features • Check speed 1500 words per minute! • Any document length. Also available for wordwise & view.

DATASTAG £59.95 (COMING SOON)



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Coming soon. A highly professional system which integrates with Database. Allows you to store your data in any format and, using Database, present all or selected items of data for graphing and statistical analysis • Graphs include Pie, bar, histograms, line plot, scatter plot • Display between one and four graphs simultaneously • Automatic scaling and direct digital readout of graph co-ordinates • Statistics include all standard tests plus linear regression and correlation etc • seven non-parametric tests • Epson screen dump included with facility to add your own printer dump.

SCRIBE ASSEMBLER £24.95

Use Scribe as a super editor for the assembler. A powerful and professional package that will assemble standard 6502 source code plus many of the non-standard mnemonics from the BBC Basic's own assembler. NOTE — Scribe is required to use the assembler.

MINI ROM BOARD £14.95

Provides four extra ROM sockets. Easy fitting and without any of the overheating and space problems associated with large expansion boards.

SPECIAL COMBINED PACKAGE OFFER

Datastag & Database (in one chip) 1	£95.00
Datascribe & Double-Dos 2	£139.00
Datascribe & Scribechec & Datastag — fitted to the Mini ROM Board 3	£165.00

Prices include VAT. Add 60p post and packing to your order.
Dealer and education enquiries welcome.

Purchasers of MCP software are provided with a free update service and an unmatched level of technical support. (Updates subject to postal charge.)

Mertec

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Please supply the following products/information. Please tick box.

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DATASCRIBE ☐	QTY	______	£	______
DOUBLE DOS ☐	QTY	______	£	______
SCRIBECHEC ☐	QTY	______	£	______
DATASTAG ☐	QTY	______	£	______
SCRIBE ASSEMBLER ☐	QTY	______	£	______
MINI ROM BOARD ☐	QTY	______	£	______
SPECIAL COMBINED PACKAGE 1 2 3	QTY	______	£	______
		TOTAL		______

I enclose £ Inc P&P

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Address ______

To: **MERLIN COMPUTER PRODUCTS**
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IMPORTANT NOTE: Please check with us if you decide to use any other disc interface than Acorn or Double-Dos with Scribe or Database.

SOLIDISK AND M

We pick up the best names in Wordprocessing software, in disc drives, in printers and offer them to you at — well, we wouldn't say it ourselves but our competitors might — a silly price.

The Wordprocessor is none other than the number one best seller for the BBC: WORD-WISE PLUS from Computer Concepts.

Respected opinions regard WORD-WISE PLUS as very user friendly, flexible, straightforward or simply excellent (1).

The Disk Drive is Mitsubishi's one Megabyte (unformatted) and can store **up to 640 kilobytes of text on a double** density single diskette.

The disk interface electronics are our 1770 based double density filing system totally compatible with the Acorn 1770 DFS and the newer ADFS.

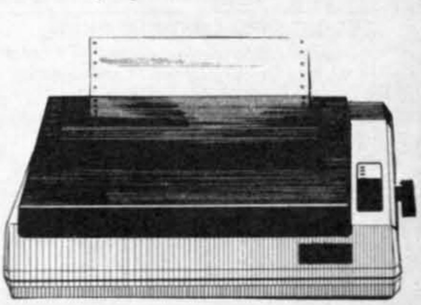
In fact, it even works with the Acorn chips. It has so many features that even experts might suspect that it's too good to be true (2).

The printer is the Solidisk PR165, has a speed of 160 cps in normal mode, is very fast in NLQ (near letter quality) mode and is Dot Matrix, bit graphic capable and Epson compatible (3).

For the icing on the cake, you also get a free Spelling Checker, Electronic Spreadsheet, Database and lots of games.

With around a quarter of the disc storage, a much slower printer, no colour and a membrane keyboard, with generally more expensive software, the AMSTRAD PCW8256 (at £399.00 + VAT) looks unconvincing.

By the way, the BBC already has more memory space than the AMSTRAD



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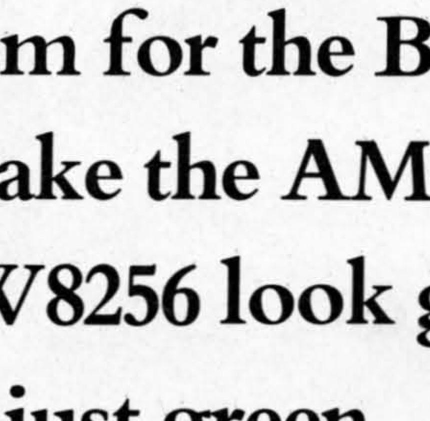
(1) See reviews in E & CM, CEEFAX, Acorn User.
(2) See reviews in Acorn User, BBC Micro User and A&B Computing.
(3) Solidisk own direct imports from Japan, subject to change without notice for improvements.

E — AN ALL IN ONE

Wordprocessing system for the BBC to make the AMSTRAD PCW8256 look greener than just green . . .

PCW8256, but if you still need more, turn over the page and look at the new Solidisk baby: up to 500K of ROMs and a cool 4 Megabytes of RAMs, enough to knock down any challenger.



AVAILABLE FROM SOLIDISK BY DIRECT TELEPHONE OR MAIL ORDER AND FROM SELECTED BBC SPECIALISTS FOR JUST £299.00 + VAT

PLUS CARRIAGE

Wouldn't you like to order one now?

Just ring this number:
SOUTHEND (0702) 354 674
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Wordchic

SOLIDISK Office System

SOLIDISK TECHNOLOGY LTD
17 Sweyne Avenue
Southend Essex

The Solidisk package contains:

One 160 CPS PRINTER,
One 1 MEGABYTE DISC DRIVE,
One DOUBLE DENSITY DFS,
WORDWISE PLUS ROM,
KEYSTRIP, 4 MANUALS
5 SOFTWARE DISKETTES
1 BLANK DISKETTE.
100 SHEETS OF FANFOLD PAPER.

To: Solidisk Technology Ltd, 17 Sweyne Avenue, Southend, Essex.
Please rush me the following:
Solidisk Office System at £355 incl. VAT + courrier carr.

I enclose a cheque/postal orders for £.................. or please debit my credit card account:

Mr Access ☐ Barclaycard ☐ no. is ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME ....

ADDRESS ....

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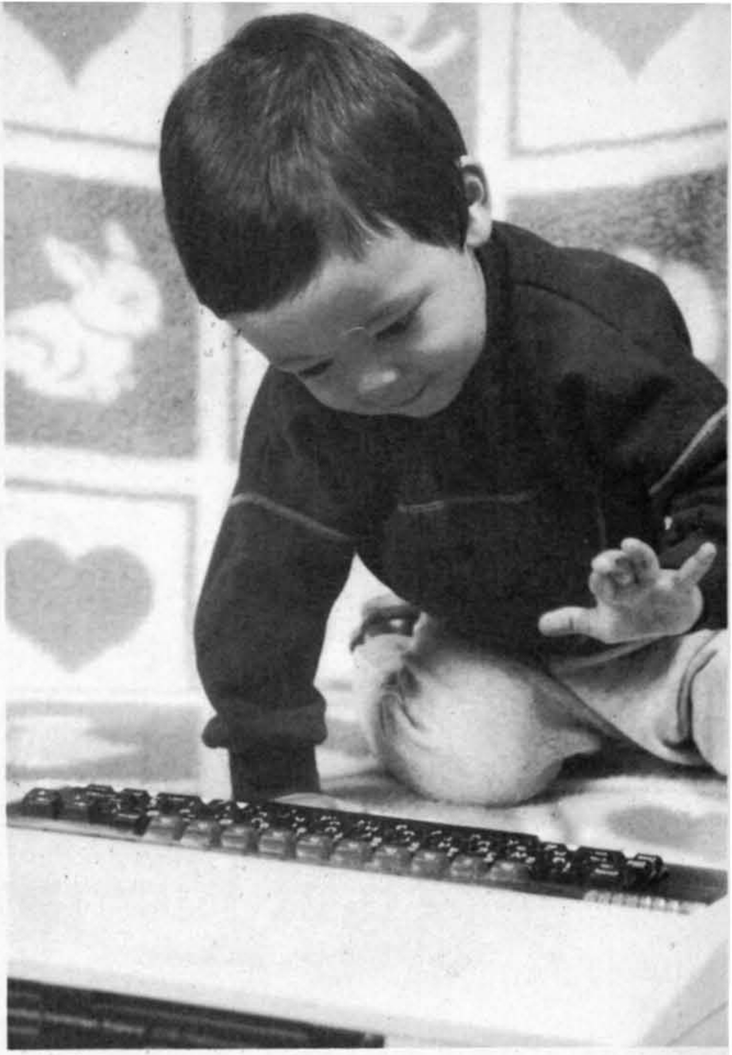
Prices and specificatoins may change without notice. Delivery subject to availability. Please ring for details.

The new SOLIDISK BABY up to 500K of ROMS and 4 Megabytes of RAMS



The Baby From Solidisk is setting new challenges to software writers.

It takes up to 256K of ROMs, anything from 8k to 64K chips and can control another 256K on the BBC board.

It has 256K of RAM built-in, expandable to a whacking 4 Megabytes.

It runs at full 2Mhz, at the same speed (and timing) as the BBC board RAM.

It already comes with lots of software to put some of its potential to good use, but it is still waiting for the new generation of fully integrated software to come. Like the INTER suite from Computer Concepts.

To start with: the famous Wordwise Plus ROM from Computer Concepts and Solidisk 32K superb Toolkit ROM are included in the deal.

The additional 256k RAM are divided into 8 banks of 32k bytes. They can be independently used as Shadow or Sideways RAM or BOTH. i.e. the top of each bank can be used as Shadow while the bottom is Sideways RAM.

The Size of the paged memory is programmable, up to 31K for Sideways RAM/ROM and up to 30K for Shadows. That's 61K bytes out of 64K memory space.

The SWR256 board plugs into the 6502 socket and the latter is placed back into the on board 40 pin socket. 2 wires are hooked to IC legs on the computer board. The installation requires no soldering and can be carried out by novices or experts alike.

In fact, Solidisk engineers can open your computer and install the board in around 100 seconds.

Prices:

The SWR256, 2 ROMs and manuals costs £175.00 inclusive of VAT.

Upgrades: (incl. VAT)

From SWR32 to SWR256	£129.00
From SWR64 to SWR256	£89.00
From SWR128 to SWR256	£75.00

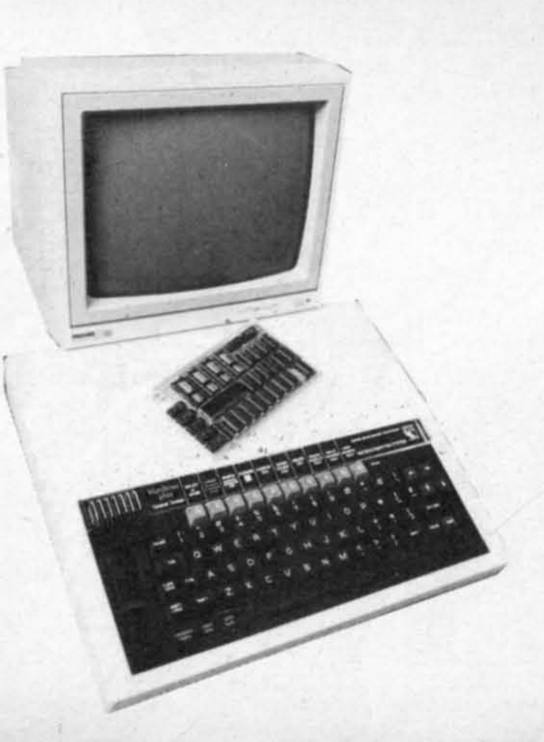
These prices include the two ROMs.

INTEGRATED SOFTWARE?

That will do nicely

Solidisk introduces the

SWR256



SPECIAL FEATURES:

The SWR256 system has a Programmable Memory Management Unit on board, totally compatible with all well known software.

It consists of a ROM register (&FE30), a Shadow register (&FE34), an Access register (&FE32), and a Size register (&FE36).

The ROM register duplicates the one built into the BBC board. It selects one of the 16 possible ROMs.

The Shadow register is new and similar to the BBC PLUS implementation. It selects one of the 128 possible Shadows or moves a Sideways RAM into the Shadow area.

The Size register is new and not implemented anywhere else. It specifies how big you want your Shadows and your ROMs.

The normal setting is 16K for Sideways ROM/RAM and 20K for Shadows.

If bit 0 is set, your Sideways ROM or RAM is 31K (useful for Hi-language, from &8000 to &FC00).

If bit 1 is set, your Shadow is 30k (useful for language, from &800 to &8000).

Bits 2 and 3 are reserved for possible Shadow modes 3 and 7.

The built-in software in the Solidisk Super Toolkit (a 32K ROM) runs with all well known ROMs and will handle all MOS calls.

By programming the Size register, it is possible for a ROM to have 61K of continuous memory, more than you can get with the 6502 Second Processor and you will still retain the paging facility.

By programming the Shadow register, one ROM can move another ROM into the Shadow area and call routines directly there.

There is also a 16 pin expansion socket on the board for direct access to the RAM array.

In a word, the Solidisk SWR256 is the perfect partner for any serious integrated software.

The new SWR256 is available by direct telephone or mail order from Solidisk and selected BBC Specialists.

SOLIDISK Office System

To: Solidisk Technology Ltd 17 Sweyne Avenue Southend Essex SS2
Please rush me the following:

.... SWR256K Ram at £175 incl. VAT and carr.

I enclose a cheque/postal orders for £...................... or please debit my credit card account:

My Access ☐ Barclaycard ☐ no. is ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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Prices and specifications may change without notice. Delivery subject to availability. Please ring for details.

WIN THE MAZE GAME . . .

Investing in extra equipment for your BBC Micro really needs thinking about; bear in mind, for instance, that for the last five years, all efforts have been put into more memory and faster disks.

The problem is that you may end up with a hotch potch of add-ons from different suppliers, and some may be reluctant to give advice on the whole ensemble.

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So how can you, too, keep pace with the latest technology?

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Solidisk design rules adhere strictly to 2 principles:

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b) 'Do it in software' if at all possible.

We have Double Density Disc Interface, Winchester, Advanced DFS, Sideways RAM, Shadow/MOS RAM and MODEM and more than 50,000 happy users.

They are happy because their computers have more facilities, run faster, look tidy and usually cost them less money.

For many, it's the support that they receive that they are most happy about.

With over 90 Local Experts covering England, Scotland and Wales, with presence in Holland, France and Australia, Solidisk can offer many users free fitting and advice.

We also make available an ever increasing catalogue of free software to all Solidisk users, except media and carriage.

Solidisk Software Support Service can give you the sort of service only matched by the largest companies.

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PRICE LIST: (all prices include VAT unless otherwise indicated. We export world wide — contact us for details on prices and delivery).

BBC SIDEWAYS RAM:	Prices	P&P
SWR32	£53.00	£2.00
SWR64	£80.00	£2.00
SWR128	£125.00	£2.00
SWR256	£175.00	£2.00
Software pack 2	£10.00	£2.00

**NB: all versions of the Sideways Ram come supplied with Software Pack 1 free of charge. Please specify 40 or 80 tracks when ordering.
Pack 1 is available without the Sideways Ram at a cost of £10 + £2 P + P.**

1770 DISC INTERFACE:		
1770 Double Density with DFS 2.0 ROM	£45.00	£1.00
1770 Double Density with ADFS	£55.00	£1.00
1770 + 8271 DFDC with ADFS	£60.00	£1.00
DISC OFFERS:		
640k with ADFS Disc Offer	£200.00	£3.00
(£10.00 Datapost)		
1.3MB with ADFS, CPU and keyboard case	£340.00	£5.00
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WINCHESTER DISC DRIVES:		
XD-10 without PSU 10MB (Minimum config)	£399.00	+ VAT
XD-10 10MB (with additional PSU)	£460.00	+ VAT
The following prices include keyboard and CPU case:		
XD-20/40 20 MB	£699.00	+ VAT
XD-20/40 TWIN (40 MB)	£1100.00	+ VAT
XD-30/60 30 MB	£900.00	+ VAT
XD-30/60 TWIN (60MB)	£1300.00	+ VAT

**All Winchester systems are despatched by Datapost within the UK, included in the prices above.
(Please remember that if you also need to use floppy disks in conjunction with these, it is advisable to also purchase our 1770 DFS interface or 1770 + 8271 DFDC interface — see previous pages.)**

EPROMS:		
2764 × 5	£24.00	£1.00
27128 × 3	£25.00	£1.00
27256 (to be used on UVIPROM32)	£10.00	£1.00
UVIPROM Eprom programmer, suitable for 2764, 27128	£19.00	£2.00
UVIPROM32 Eprom programmer, special for AMD27256	£20.00	£2.00
UVIPAC Eprom Eraser	£21.00	£2.00
DISKETTES:		
Datalife MD525 SS/DD	£17.00	£1.00
Datalife MD557 2S/4D	£28.00	£1.00
MISC.		
CPU and KEYBOARD case	£30.00	£4.00
Solidisk TOOLKIT a must for ADFS	£10.00	£1.00
DFS + ADFS if purchased separately	£20.00	£1.00
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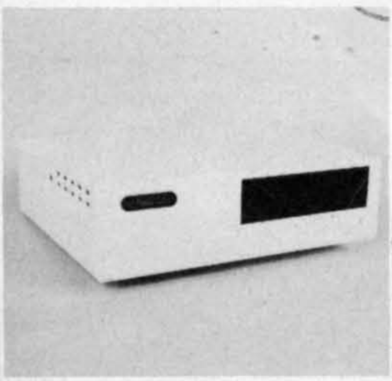

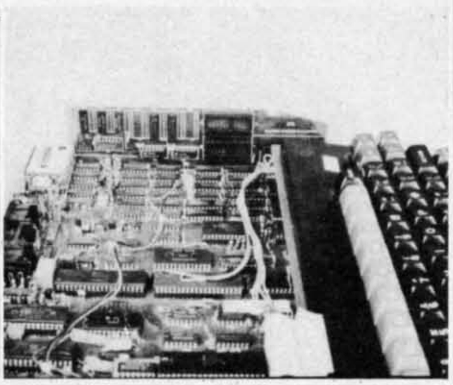

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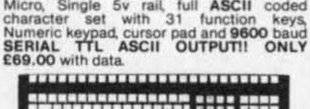

Carriage on all Keyboards £3.50

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Manufactured by **PLESSEY** Ltd this compact unit, only slightly larger than a telephone, features an all in one **TELEPHONE**, 24 x 40 character CRT screen, **VIEWDATA – PRESTEL** modem, Keypad and electronics to run as a fully fledged **PRESTEL** terminal or telephone. Ready to plug direct into a BT 600 type jack socket and instantly connect you to **PRESTEL** etc. Many other features include Memory dialling, Recall button, Off line screen data storage, Picture expand, Standard Mullard LUCY chip set, Integral 5" JVC crt monitor, etc etc. Designed to sell to the **EXECUTIVE** at over £600!! But from **DISPLAY, BRAND NEW AND BOXED** at only £99.00 for **DTMF** tone dial or **£140.00** for standard **DIAL PULSE** version.
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'SYSTEM ALPHA' 14" COLOUR MULTI INPUT MONITOR
made in the UK by the famous **REDIFFUSION Co.** for their own professional computer system this monitor has all the features to suit your immediate and future monitor requirements. Two video inputs: **RGB** and **PAL** Composite Video, allow direct connection to the **BBC** and most other makes of micro computers and **VCR's**. An internal speaker and audio amplifier may be connected to your systems output or direct to a VCR machine, giving superior sound quality. Many other features included PIL tube, Matching **BBC** case colour, Major controls on front panel, Separate Contrast and Brightness – even in **RGB** mode, Two types of audio input, Separate Colour and audio controls for Composite Video input, **BNC** plug for composite input, 15 way 'D' plug for **RGB** input, modular construction etc etc.

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DECCA 80, 16" COLOUR monitor. Compositve video input. Same as above model but fitted with Composite Video input and audio amp for **COMPUTER**, VCR or **AUDIO VISUAL** use. **ONLY £99.00** + Carr.
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GOULD G6-40A 5v 40 amp switch mode supply NEW £130.00
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TRANSDATA 307A Acoustic coupler **300** baud full duplex, originate only, **RS232** **£49.00**

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- Just 2 wires to comms. line

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-ELECTRONICS-

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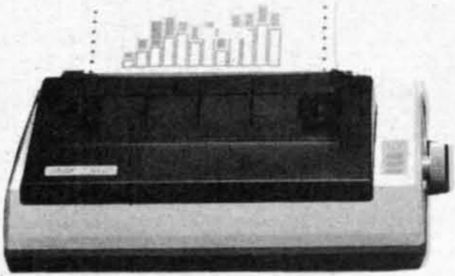

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THE *INCREDIBLE* NEW STAR SG-10 NEAR LETTER QUALITY PRINTER.

features:—

- Epson and IBM compatible print codes
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- Standard parallel Centronics interface
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Just clip this advertisement to your order and send cheque for **£267.85**
Orders before 25th December

Character Sets

96	Standard ASCII Characters
88	Standard International Characters
96	Italic Characters
88	Italic International Characters
96	NLQ Characters
88	NLQ International Characters

Character Matrix

Standard Characters: 9 dot × 11 dot
STAR Block Graphics: 6 dot × 6 dot
IBM Block Graphics: 12 dot × 11 dot
User Defined: 8 dot × 4 to 11 dot
Near Letter Quality: 17 dot × 11 dot

Character Fonts

Normal (10 CPI)
Elite (12 CPI)
Condensed (17 CPI)
NLQ (10 CPI)

Line Spacing 1/6, 1/8 in. or 7/72 in. Standard

Dimensions (W × D × H)
392 × 315 × 145mm (15.4 × 12.4 × 5.7 in.)

Number of Columns
80, 96, 136, (40, 48, 68 Double Width)

Print Head 9 Wires (User Replaceable)

Star SG-10 £259 + VAT	**£297.85**
Parallel cable for any Micro (max. price)	**£20**
2 Spare ink ribbons	**£5**
2000 sheets of continuous listing paper	**£15**
Next day doorstep delivery service	**£10**
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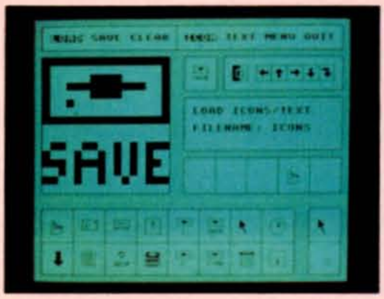
ICON MASTER — Icon Control System

GIVE YOUR PROGRAMS THAT PROFESSIONAL TOUCH



This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

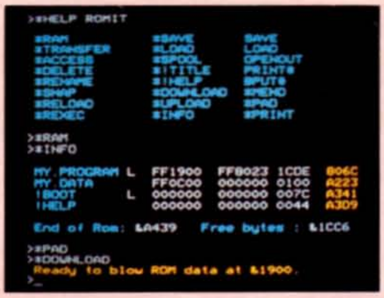
It is easy to use and may optionally be controlled with the AMX mouse. Icons (sample sets provided) are designed on a special Icon screen editor and are compatible with AMX icons.

Having designed the icons, the next step is to select the Menu editor and design your final screen. You may position your icons and text wherever you choose on the screen. Icon Master then generates the code to append to your Basic program which will reproduce your icon screen and handle user input.

Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.

ROMIT — Put your own Basic programs into Rom

CREATE YOUR OWN SILICON DISC



```
>*HELP ROMIT

 *RAM           *SAVE        SAVE
 *TRANSFER      *LOAD        LOAD
 *ACCESS        *SPOOL       OPENOUT
 *DELETE        *!TITLE      PRINT#
 *RENAME        *!HELP       BPUT#
 *SHAP          *DOWNLOAD    *MEHD
 *RELOAD        *UPLOAD      *PAD
 *REXEC         *INFO        *PRINT

>*RAM
>*INFO

 MY.PROGRAM L  FF1900  FF8023 1CDE  806C
 MY.DATA       FF0C00  000000 0100  A223
 !BOOT      L  000000  000000 007C  A341
 !HELP         000000  000000 0044  A3D9

 End of Rom: &A439   Free bytes : &1CC6

>*PAD
>*DOWNLOAD
Ready to blow ROM data at &1900.
>_
```

RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:

1. Create a silicon disc with its own filing system commands. Type ★RAM, then you can catalogue the 'disc', save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

2. Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **★RAM ★TRANSFER "prog" ★DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

3. Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ★commands are provided by RomIt

To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.

ICONMASTER £34.00 ROMIT £34.00 inc. VAT

Available from your local dealer. **Supplied on 16K Rom.**

For further information: Tel St. Albans (0727) 40303

24 hour Access & Barclaycard hotline
Tel Penn (049481) 6666

Mail order to
Beebugsoft, P.O. Box 109, St. Johns Road,
High Wycombe, Bucks, HP10 8NP

BEEBUG SOFT

BEEBUGSOFT

Here's IBM, Epson QX- Acorn Electron, ACT Ericsson...and t that fits them all–the

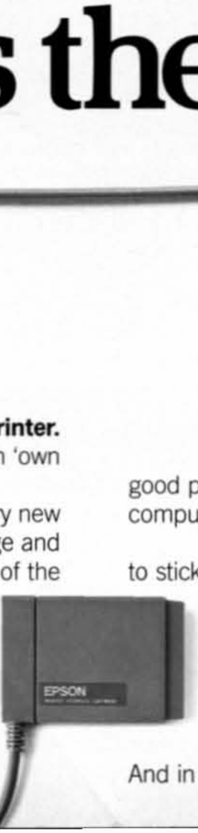
At last, your computer can have an Epson printer.

Even if it's only supposed to be compatible with 'own brand' printers (like Atari).

Our latest printer, the GX-80, has a revolutionary new interface called PIC (it means Printer Interface Cartridge and that's it on the right). The cartridge slips into the back of the GX-80 and enables the GX to understand commands from the host computer.

So if you've ever wanted to have an Epson printer for your micro but thought you couldn't, here it is.

But first, read about the GX-80's other cracking advantages . . .



What happens when I change computers?

Gone are the days when you had to scrap a perfectly good printer just because it 'didn't go with' your new computer.

Once bought, your GX-80 stays put. (Epsons tend to stick around for ages anyway; now we've taken tradition a little further.)

When the time comes to upgrade your computer, you simply go back to your Epson dealer and buy the corresponding new PIC.

It's a far sight cheaper than being forced to sell/scrap out your printer only to buy another one. And in effect it makes the GX-80 your printer for life.

a plug for any Atari,
6, Apple IIc, BBC,
Sirius/Apricot, Compaq,
his is the printer
new Epson GX-80.

A printer for life? What's the catch?

Sheer, unremitting boredom.

The GX-80 takes all the fun out of printer ownership. You can't shout, "Lousy printer! It's fouled up again!" because it won't. It's just as reliable as every other Epson.

Nor can you gleefully chuck it merely because you've changed computers — PIC's seen to that.

But all is not lost. You could change your computer a bit more often. Just for fun.

EPSON

Epson (UK) Ltd., Dorland House, 388 High Road,
Wembley, Middlesex HA9 6UH. Telephone 01-902 8892.

I'm looking for a permanent relationship too. Tell me the rest about the GX-80 with PIC.

Name ______

*Position/Company ______

Address ______

______ Tel No. ______

KMU 1

*Please leave blank if inapplicable.

Gemini ROMS

The Definitive Random Access, 24K ROM based Database Management System for the BBC B and BBC B+.

"Excellent if you can afford it..." (ACORN USER Dec. '84)

Now compatible with most double density DFS's

Now You Can!

~~£129.95~~ £79.95

DATAGEM

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
- Allows the user to extend the file or add fields after having started to enter data.
- Offers a free format painted screen which scrolls 120 x 120, and supports extensive mathematics.
- Provides User defined field relational variables and multiple and single character wildcards.
- Exists self contained on ROM, and does not require additional utilities on disk.
- Finds the occurrence of a string or partial string in ANY field in the database with just one command.
- Mathematical Operators
  +, −, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

MONEY-BACK GUARANTEE

The power and facilities of DataGem are just too great to detail in this advertisement. As the product is protected against unauthorised copying, we are able to offer our no-quibble money-back guarantee to customers purchasing DataGem direct from Gemini. If you don't agree that it's worth the price, send it back to us undamaged within 7 days of purchase for ANY reason and we'll refund your money – immediately.

Gemini
DATAGem

STOP PRESS!!

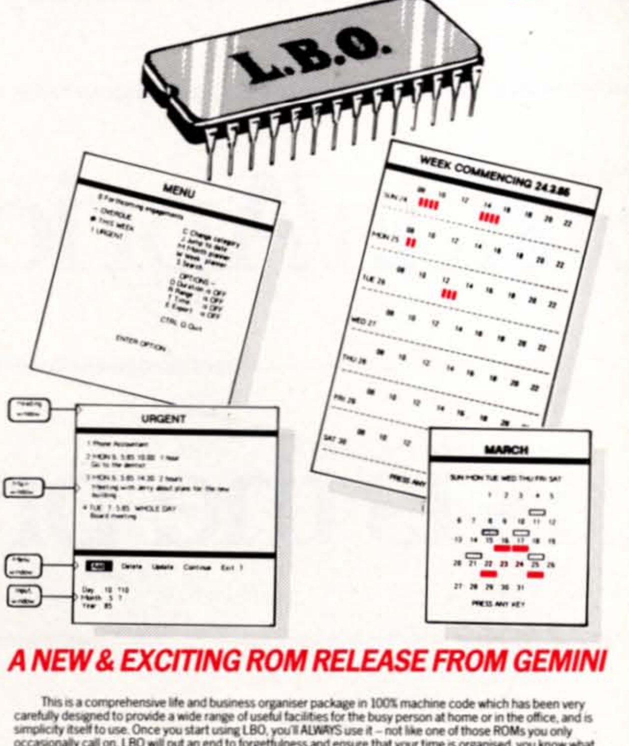
New DataGem owner's manual (see above) available separately at

£12.95 inclusive

Price refundable against purchase!

L.B.O. LIFE & BUSINESS ORGANISER

– the ULTIMATE BBC utility!



A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Gemini
SERIOUS SOFTWARE
LIFE and BUSINESS ORGANISER

L.B.O. only **£19.95**

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.

Gemini ⟹ DISK SOFTWARE ⟹

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD-BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD-CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

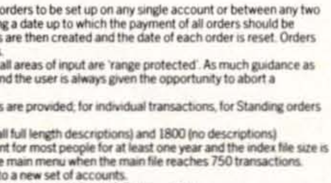
DDD-PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

NEW!

MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

See us at the
ELECTRON &
BBC MICRO
USER SHOW
New Horticultural Hall
London SW1. Nov. 14-17

ONLY
£12.95
Highly
Recommended

Gemini —— VALUE! ——

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!

OFFICE MATE

• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money!
(Price if purchased individually - £79.80
– save £67.80 with this pack)
Electron version available,
pack contains Database, Beebplot,
Beebcalc, Home Accounts,
Cassette only.

OFFICE MATE
£12
Cassette or Disk

OFFICE MASTER

• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER
£25
Cassette or Disk

Gemini INTEGRATED ACCOUNTS & HARDWARE

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated ... for example, when typing an invoice manually, the typist could type £14.25 instead of £41.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the price (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience.

We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical ... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file.

Price £69.96

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes.

Price £69.95

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file.

Price £69.95

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file.

Price £69.96

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CentreSoft Ltd

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INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with error trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

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Includes 1 year software support

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Having arranged bulk hardware purchasing discounts, Gemini is now able to offer complete systems of hardware and software offering unequalled value for money. We offer a choice of hardware only or hardware with software as follows:–

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THE MICRO USER NEWS

December 1985

RED ARROWS FOR THE BBC

TO make Red Arrows the most demanding – and rewarding – flight simulator ever devised for the BBC Micro, the programmers at Database Software threw out the computer's entire operating system and designed their own.

The result is that all but one tiny part of RAM memory is available for the all-action 3-D colour graphics which soar to heights of realism not achieved on previous versions of the program for other machines.

Written in cooperation with the world-famous pilots themselves, Red Arrows faithfully reconstructs the intricate manoeuvres with which the RAF aerobatics team has held millions of people spellbound.

The operating system accurately reproduces the dramatic aerial action and runs much faster than earlier versions, with screens updated four times a second.

More technological innovation gives seven instead of the usual four colours in Mode 5, and flicker is reduced to a minimum with none affecting the planes themselves.

The British Aerospace Hawk "flown" by the operator has been given greater thrust and manoeuvrability than the other jets to help the BBC Micro user maintain its correct location in the squadron formation during the many intricate displays.

Feedback from players of earlier versions has led to a further improvement – the centralising of the roll key and nose up/nose down key for easier control of the Hawk's movements.

The BBC Micro version also contains four extra sets of sprites for added graphic activity.

Such is the expertise needed to "fly" the Red Arrows simulator, it boasts its own training program with four degrees of difficulty.

"When we first looked at the specifications for

Turn to Page 24

A breakthrough for the blind

Now a talking spreadsheet for the BBC

A MAJOR breakthrough for the blind and partially sighted has been achieved with the launch of a talking spreadsheet for the BBC Micro.

Designed by a student at Sheffield Polytechnic with the help of a local man blinded in the last war, Audiocalc represents the first access of the visually handicapped to a personal computer calculation system.

It was developed by 21-year-old Philip Jennings as his final year computer studies project, and it resulted in him gaining a first class BSc honours degree.

He worked closely with Peter Jones, 63, who lost his sight in an accident in 1940. The holder of a BEM for services to the local community, Peter Jones' involvement was sponsored by St Dunstan's, the London-based association for people blinded on war service.

Together they came up with the spreadsheet that speaks for itself.

So impressed was senior computer studies lecturer Bob Steele with the result that he was determined it should be developed further.

He decided to contact Sceptre, the local authority-financed Sheffield centre for product development and technological resources.

Appreciating the potential, Sceptre negotiated a joint development and marketing programme with Davy Computing, a Sheffield systems house.

The end result is Audiocalc. Tables of text and numeric data, including formulae, can be manipulated, stored, reloaded and printed with all section headings, prompts, error messages and key depressions confirmed via a voice synthesiser.

Displayed

After being "read" by the voice synthesiser, information relating to the current cell or spreadsheet status is displayed on screen in double height characters making the system suitable for use by a partially-sighted person.

Data input is via the BBC Micro keyboard, and all key depressions are echoed. The system prevents the user from entering erroneous data by speaking all error messages and asking for new input.

On the other hand, data output can be either visual, printed or spoken.

The screen consists of 12 easy-to-see rows of 40 characters, while the whole table can be printed using either a conventional or braille printer.

Philip Jennings, original designer of Audiocalc, explains the system to David Blunkett, leader of Sheffield City Council who has been blind since birth.

Davy Computing has the sole distributorship for Audiocalc worldwide. The price for the software package in this country will be around £240.

"It is going to open up a whole new world for the blind", a St Dunstan spokesman told *The Micro User*.

After the Hobbit . . .

LORD of the Rings Part I, sequel to The Hobbit, has been released for the BBC Micro by Melbourne House. The price of £15.95 includes two cassettes, the paperback version of "The Fellowship of the Rings" and a 32 page instruction booklet.

Also new from Melbourne House is Gyroscope, a game of dexterity and skill involving guiding a gyroscope over an undulating landscape. Price is £8.95.

Software man beats disability

A SEVERELY disabled man who can only communicate by operating the keys of his BBC Micro with a pointer attached to his head has recently completed his PhD thesis.

Cerebral palsy has left Richard Gomm with no speech and virtually no control of his body.

Yet using software written by himself he has just completed the herculean task of preparing the manuscript.

"It is a monumental achievement", an educationalist told *The Micro User*, "for apart from the academic skills involved Richard's typing speed is only five words a minute".

Living in Dyfed, Wales, with his parents, Richard featured in a BBC Micro Live program describing how his computer has become his life line, even enabling him to gain a degree from York University.

Not only does he use it in his academic studies but he also has it linked up to enable him to switch lights on and off as well as operating his television.

However it is the system he has lately designed which pleases him the most.

With the help of local hardware and software consultant John Piper he now operates his BBC Micro alongside an Apple II+.

Here is how Richard Gomm described it, using the word processor package he has written himself.

“THE Apple has 96k of RAM, two 5.25in discs, and two 8in discs (either pair would do on its own). It runs a program called Theseus which I have written.

Theseus is basically a word processor with various word stores and word anticipation routines.

I have added a voice module allowing me to access its vocabularies while using the voice synthesiser.

The speech unit is the Type and Talk synthesiser made by Namal and distributed by the Cambridge Microcomputer Centre. It has in-built text to speech conversion routines which are superior to other units, but the user is still required to adapt many words so that the pronunciation is correct.

The BBC Micro has the standard 32k and double 80 track drives. As far as speech is concerned only one drive is necessary.

It runs a program written by me called Linkup. This handles the modem, feeding it with numbers for it to dial, choosing between data or voice communication, allowing the user to answer the phone, etc.

If the user limits himself to a single disc drive it is possible for him to dial or answer the phone for voice communication by only employing four or five keys on the right-hand side of the keyboard.

This allows one to sit at the Apple and reach across to press the appropriate BBC keys. The modem is a TM200 made by Tandata. It has automatic-dialling and battery backed storage for eight phone numbers.

Linkup gets round this storage limitation by feeding the modem numbers from directories on disc.”

Now that he has completed his PhD course Richard has only one more ambition left – to land himself a full time job writing software.

Red Arrows competition

From Page 23

the program we realised it was so realistic you would almost need a pilot's skills to come to grips with it", says Derek Meakin, head of Database, "so we decided to incorporate a full-scale training program".

Novice flyers receive Help messages as part of their training and a chosen key can pull them back into formation if conditions get too hairy.

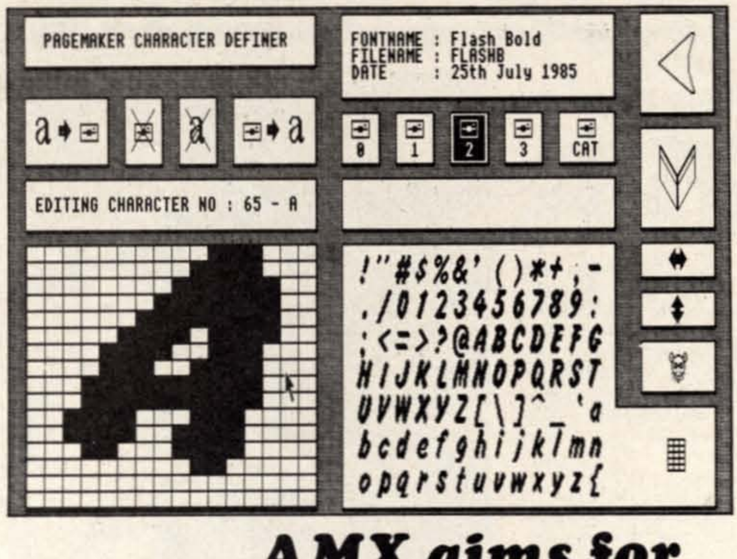
They can also learn to fly the Hawk in solo mode before joining the rest of the team.

The training program also includes an auto-pilot facility to control either thrust or course as the would-be Red Arrows perfect their aerial skills.

For those who can prove they have outstanding skills the simulator package offers a free high-score competition to win an all expenses paid weekend during which they will visit the Red Arrows at their RAF Scampton base.

The program costs £8.95 on cassette. Disc versions are £12.95 for the 3in and £11.95 for 5¼in.

Part of the proceeds from the sale of the program are to go to Service charities nominated by members of the Red Arrows team.



PAGEMAKER CHARACTER DEFINER

FONTNAME : Flash Bold
FILENAME : FLASHB
DATE : 25th July 1985

EDITING CHARACTER NO : 65 - A

AMX aims for the headlines

A NEW software package for the BBC Micro has been designed not only to hit the headlines but to make them up as well.

Known as the AMX Pagemaker, it comes from Advanced Memory Systems of Warrington, the company that produces the highly successful AMX Mouse.

After its public showing at the November Electron & BBC Micro User Show, it is being primarily aimed at the school and college newspaper market.

Combining a low cost typesetter, graphics and word processor on two ROMs and two discs the Pagemaker also lends itself to posters, menus, notices – in fact anything that needs to be created on A4 size paper.

It is possible to load in Wordwise and View files which will be formatted as they appear on the screen, whether they are appearing as 80 column characters or one of the 16 fonts available.

Cut and paste facilities allow professional composition. Any area of the screen can be cut and saved, no matter what size.

The cutout can then be reloaded and superimposed over what is already on the screen. Printer dumps are supplied to allow production of a full A4 page or any part of it.

Using the AMX Pagemaker, digitised pictures can be loaded, and the graphics options can be used to doctor pictures.

In fact, pictures from all BBC Micro graphics modes can be used thanks to a special conversion program supplied with the package.

The AMX Pagemaker costs £49.95.

Multiple choice programs

SOFTWARE house Kosmos has launched the first nine titles in a new range of leisure and educational programs for the BBC Micro called the Factfile 500 Series.

Twenty programs are being released before Christmas, each containing 500 facts – a total of 10,000 questions, answers, facts and figures compiled by teachers and specialists and presented in multiple choice format.

Factfile 500 packs cost £3.95 each and are intended for use with any of the Kosmos Answer Back Quiz master programs which present the questions and provide the games which are used as a reward for successful players and students.

Titles so far released are Arithmetic, Spelling, Natural History, General Science, Junior General Knowledge, Senior General Knowledge, Know Scotland, First Aid, and Sport.

The Factfile 500 programs are also available on disc for £5.45 each and each pack, cassette or disc, contains an entry form for a £50 cash prize draw.

ELECTRON &
BBC MICRO
USER SHOW

Computer literate children – some as young as five – from around the Grater London area jumped at the chance of becoming "teachers" at the November Electron & BBC Micro User Show. Their brief – to demonstrate the ease of use of the BBC Micro.

BBC Micro is churches' link

THE recently-formed Christian Micro Users Association has pledged to support the BBC Micro in its work of linking together computer users of various denominations and promoting the use of micros in church activities.

Association secretary Philip Clark told *The Micro User:* "There is a great need to discover and make contact with the individuals and companies producing 'Christian software'.

"We also need to share the expertise and ideas of the many who have sought to use micros in their church related activities".

The aim of CMUA is to concentrate on the popular home computers like the BBC Micro and it has already unearthed a significant number of programs based on Bible studies.

The association intends to produce a quarterly magazine called Christian Micro and launch a series of tape magazines for specific micros.

Show's a real pre-Xmas cracker!

A SURVEY of exhibitors at the November Electron & BBC Micro User Show has revealed that more than 50 new products were scheduled for release.

It has established that 35 packages are currently completed and waiting to be unwrapped, with developers of a further 20 working against the clock to get them to the show on time.

"It is shaping up to be a pre-Christmas cracker", says Derek Meakin, head of Database, the show's organisers. "We have never had as many new products released at any one of our previous shows. And there will be literally hundreds of special offers available".

Among the new products:

A Mega ROM from Chalice Software. With more than 60 commands to cover the entire range of utilities for the BBC Micro and the BBC B+, it is priced at £34.95.

Slogger Software's graphics extension for the BBC Micro and the Electron, price £21.95.

Norwich Computer Services' latest book in the Wordwise Plus Series. Written by Paul Beverley, "More Wordwise Plus Programs" is priced at £7.

Also on the literary front, Computer Bookshops has several new titles, including "Adventures with the BBC Micro". Aimed at "the dungeons and dragons fraternity", it is priced at £8.95.

On the Collins Publishers stand show visitors interested in self analysis could find a new program called "The Real You". It costs £14.95 on cassette, £16.95 on disc.

Viglen has a new console for the BBC Micro for £39, and System has brought out a new Midi Interface for The Music System.

An all-in-one word processing system from Solidisc includes Wordwise Plus, disc drive, printer and lots of software for £299.

LCL has launched an improved version of its New Maths package with enhanced graphics.

GEC is adding to the growing list of BBC Micro compatible modems with a new model known as Datachat.

"With all this range of exciting new products on offer, visitors can be expected to do a lot of their Christmas shopping at the show – even if it's only for themselves", says Derek Meakin.

A PROGRAM which can check spelling at 3,000 words a minute receives its first public airing at the Show.

Scribecheck, which works in conjunction with Scribe, is marketed for the BBC Micro by Bucon at £24.95.

NEW PRODUCTS GALORE ON DISPLAY

ONE exhibitor, Beebugsoft, based in St Albans, Herts, will launch seven new products at the Electron & BBC Micro User Show.

"As far as we are concerned the Electron & BBC Micro User November Show is the most important event of its type in the year", says Adrian Calcroft, of Beebugsoft.

"That is why we always use it as our major launching pad". His company is to unveil:

Spellcheck III, a new release of the automatic spelling checker for letters and documents produced on Wordwise or View.

It is now supplied on 16k ROM (including about 2,000 words stored in ROM) with an accompanying dictionary disc containing an additional 6,000 words.

Test timings: 1,620 words a minute with Watford 1.3 DFS, 2,000 words a minute with Acorn 1.2 DNFS and 6502 second processor. Price £36.

Icon Master automates the creation of an icon-driven user interface. It allows users to design a screen containing icons and then use it in their own programs in place of a normal menu.

It may be controlled with the AMX mouse. Icons – sample sets are provided – are compatible with AMX icons. Price £34.

Toolkit Plus offers over 40 commands, a Syntax Checker and a Basic Editor. Price £39 on ROM.

Romit adds a new feature to the BBC Micro, a RAM filing system. It provides over 20 new commands. Price £34.

Studio 8 contains more than 20k of machine code and converts the BBC Micro into a four voice synthesiser with an eight track digital recorder and a rhythm and drum machine. Price £22 on disc, £17 tape.

Help II is now in 16k ROM with over 30,000 characters of text about Basic, Assembler, FX calls and disc errors. Price £31.

Wordease, the Wordwise Plus utility disc, is also available on ROM. It is supplied as a pair of 16k ROMs. Price £29.

ISLAND'S MICRO GETS ITS GEAR

CHILDREN on the remote island of Niue in the South Pacific are at long last able to use their one and only computer, a BBC Micro, thanks to the generosity of a group of Maidstone youngsters.

Although the islanders have had their micro for some time, they had no software and their children were missing out on computer studies.

Their plight was brought to the attention of pupils at Swadelands School by a TVS programme on schools and computers which included a plea for help from the islanders.

The Maidstone youngsters – some are pictured here with Head of Science Victor Young – immediately embarked on a fund raising drive and, with the aid of generous donations from several UK software houses, amassed £1,500 worth of BBC software.

A breakthrough for BBC Micro artist

AN artist who put away his paints and pallette in favour of a BBC Micro is now gaining national recognition.

In just one week recently Jonathan Inglis had his work featured in two top publications – the Sunday Times Colour Magazine and Time Out.

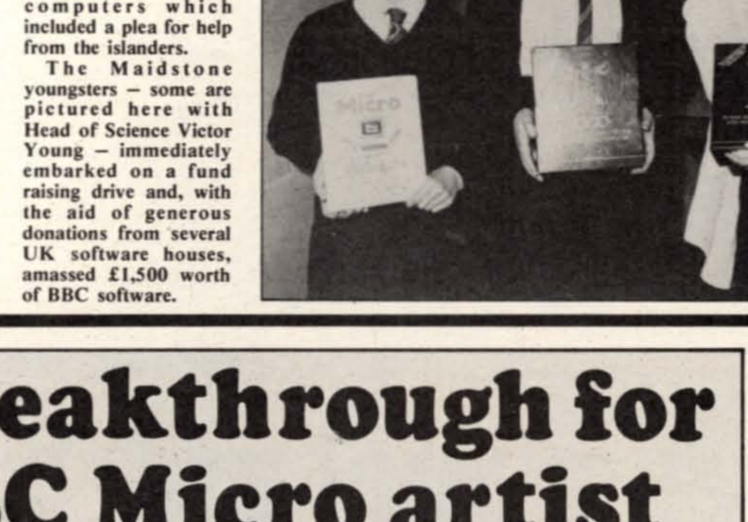
Both illustrations were created by a BBC Micro with a little help from some readily available graphics-oriented peripherals and programs.

"Even though I admit that a knowledge of the workings of Basic has been helpful to me, the programs used to create these pictures require no specialist knowledge of computer programming", he told *The Micro User*.

"Having studied fine art at Reading University, I still regard myself essentially as an artist rather than a computer buff".

Not that Jonathan Inglis can't hold his own on the subject of micros. After all, he is the author of more than 20 books on computers, seven of them on the BBC Micro.

However his first love these days is the art form that can be produced by computer.



Part of Jonathon Inglis's dump for the Time Out cover

"I find being able to use contemporary technology to create and display my work immensely exciting", he says.

But how does he go about his computer art?

He explained: "A graphic tablet – a device which plugs into the computer – is used for the main drawing.

"You draw it on with a special electronic pen.

"Below the tablet's surface is an electronically sensitive membrane which records the position of the pen as you draw.

"This information is relayed to the computer which displays the resulting drawing on the monitor.

"Simple shapes and lines can be drawn with the minimum of fuss. To draw a line, one simply plots its start and end points. For a circle one plots both centre and radius points.

"More complicated shapes can be drawn freehand or built up using straight lines. A choice of colours is available and these can easily be changed at the press of a single key".

Now that Jonathan Inglis has achieved a breakthrough with his computer art, he hopes soon to hold an exhibition of his work.

"It is all part of my overall plan to elevate such micro created work to a legitimate art form", he says.

Taking the right line

DEVELOPED by Primary Programs in conjunction with the Microelectronics in Education Project, Phonin is a disc-based package for the BBC Micro which teaches telephone skills to primary school pupils and children with special needs.

It comprises a specially adapted British Telecom type dial telephone, two 40 track discs containing a suite of programs, a manual and four BT publications.

The programs begin at elementary level and go on through telephone sounds, dialling a number, emergency and information services to using the directory.

A number of utilities include the ability to create and adapt up to nine directories for the pupils' use.

Others adjust the volume, print out directories and code books, select a payphone option and adjust delays to suit the pupils' needs.

The telephone is plugged into the "analogue in" port on the BBC Micro and simulates a real receiver. An option allows the use of an A4-128 Concept Keyboard and three overlays are supplied in the package. Price: £38.50.

DESIGN COUNCIL CHOICE

THE Design Council has selected the Penman robot plotter to feature in the first exhibition to be mounted in its new Innovation Centre which has been set up to promote new products, prototypes and research.

Exhibits are changed every four to six weeks, with different themes such as fibre optics, marine technology, holography and biotechnology.

Penman is running a special offer over the Christmas period of a £249 package including plotter, Micad 2D and 3D design software to run on a BBC Micro.

BBC breakthrough brings £1m order

THE BBC Micro has finally made its long-awaited major breakthrough into the North American market.

An order for 1,000 systems, worth more than £1 million, has been placed by the Ontario Ministry of Citizenship and Culture in Canada.

Machines with disc drives, monitors and printers will be installed in community centres throughout Ontario, principally for use by schoolchildren.

The order follows a one-year trial in which 135 North American version BBC Micros were tested at centres alongside nine other types of computer.

"They proved enormously popular with both children and adults", says Joe Black, sales director of Acorn's education, training and consumer division.

"In particular we benefited because we could offer a huge range of software, having fitted the micros with UK operating systems.

"Altogether we specifically recommended 500 titles from Acorn, the BBC and other software houses".

Some of the centres in Ontario that will use the systems are so remote that the equipment will have to be delivered by helicopter.

"Hence the BBC Micro's reputation for fault-free quality was an important factor too", says Black.

"Nevertheless, in case any problems occur, special servicing arrangements are being set up in Toronto".

Following this breakthrough, and intial reactions to other BBC Micros on loan for trials in schools and universities throughout Canada, Acorn expects further orders shortly.

Tim programs himself into a job

Tim Davis is interviewed by North West disc jockey Mike Sweeney (right) after winning a job during the Electron & BBC Micro User Show in Manchester. Looking on (centre) is John Clayton, producer of the Mike Sweeney Show on Piccadilly Radio

TIM Davis has made certain he won't be joining the ranks of the unemployed when he leaves school – by winning a job.

The 17-year-old from Formby, was successful in the North West competition sponsored by *The Micro User*.

Now he'll be joining Database Software, a division of Database Publications, as a trainee programmer once he has completed his A levels.

The teenager, who already has nine O levels to his name, was one of 350 unemployed youngsters from the North West who entered the contest.

All they had to do was send in any program they had written.

Tim's entry was a disassembler in machine code, including Ascii dump, labels and other utilities.

This took him into the grand final which was held during the opening day of the Electron & BBC Micro User Show in Manchester.

He negotiated the last hurdle by beating off the competition from the two other finalists in a test situation followed by an interview in front of a panel of judges.

"It was all a bit nerve racking", he told *The Micro User*, "but it was worth it to win a job.

"What more could any one want, particularly when you live in an unemployment black spot like Merseyside?"

After discussions with Database, Tim decided to return to school to take his A levels before starting work.

"It's fantastic", he said, "they are even going to keep the position open for me while I finish my schooling".

Judges for the final included star North West disc jockey Mike Sweeney of Piccadilly Radio, his producer John Clayton, Richard Hemingway of Radio Manchester, Peter Davidson, head of Database Software, and Derek Meakin, joint managing director of Database Publications.

"The standard of entries for the competition were very high", said Derek Meakin, "but Tim's was nothing less than brilliant.

"He has a great future ahead of him with our company".

Birthday presents for the visitors

A MAJOR exhibitor at all the Electron & BBC Micro User shows, Watford Electronics will be celebrating its 13th birthday during the latest event.

The company, which started in a bedroom and grew to be one of the country's leading suppliers in the Acorn market, will mark the occasion with a number of "sensational" bargains.

"No one will have seen anything like it", Watford boss Nazir Jessa told *The Micro User*. "It may be our birthday, but it will be our customers who end up with the presents. We intend to make sure of that".

Such has been the success of the company over the years that it recently moved into a purpose-built £700,000 headquarters that reflect its current multi-million pound annual turnover.

This now houses Watford's 30 staff and more than 7,000 different components and micro peripherals.

CLARES Nº1 IN UTILITY SOFTWARE!

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The all new improved REPLICA III is now available and it's better than ever. Just look at the features below and place your order now by ACCESS or cheque.

- *DISC BASED - No ROM sockets required
- *ONE TIME PURCHASE ONLY
- *AS MANY DISCS AS YOU LIKE
- *COMPATIBLE WITH MOST DFS & DDFS
- *B+ COMPATIBLE
- *SIDEWAYS RAM COMPATIBLE - uses sideways RAM, including that in the B+, if it is there and so enables the transfer of many more programs.

As a thank you to our 30,000 REPLICA II users you may return your REPLICA II for upgrade to REPLICA III for just £12.

Enhanced BETA-BASE £25

WHAT IS DATABASE?
It is a FILE containing RECORDS , each record consists of a number of FIELDS containing the information - an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access - disc based, single or dual drives
2) File Size - max 65,000 records
3) Record Size - up to 2048 characters and 200 fields
4) Field Size - up to 254 characters
5) Holds - approx 1200 ADDRESS records per 100k
6) Search - 5 search fields using powerful options
7) Sort - 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

- *CALCULATE - using any valid expression
- *PRINTOUT - Powerful options
- *REDEFINE - Titles, fields etc.
- *TRANSFER - From one file to another
- *GLOBAL ENTRY - of repetitive data
- *SEARCH LISTS - Allow creation of sub Databases within main Database
- *SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
- *INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure
- *TUBE - compatible with the 6502 second processor
- *Comprehensive manual and tutorial.

"We use Beta-Base ourselves"
Mike Bibby Editor of MICRO USER
"Beta-base is a joy to use" BEEBUG March 85
"Excellent value for money"
A & B Computing OCT 84
"Rated best value for money"
ACORN USER Dec 84
Ask for our data sheet if you need to know more.

BETA-BASE UTILITIES £12.00

Extend the power of Beta-Base with the extra facilities provided on this disc.

- *MAIL MERGE
- *LABEL PRINTER
- *DISC SORT
- *EXTENDED SEARCH
- *FREE FORMAT TRANSFER
- *FAST PACK
- *STATUS

The MAIL MERGE alone is worth £12 so you get a real bargain with this disc. The features are so numerous that we cannot mention them all here.

Ask for our UTILITIES DATA SHEET if you want more information.

New! BETA-ACCOUNTS INVOICE & DELIVERY NOTE MODULE £25.00

- *INTEGRATED ACCOUNTS and DATABASE
- *MULTIPLE VAT rates
- *SCREEN EDITING with insert and overwrite
- *AUTOMATIC DELIVERY NOTES
- *INVOICE COMMENTS
- *ACCOUNT HOLDERS details inserted automatically
- *MAILING LIST generated automatically
- *LEDGER SHEET printed automatically
- *VAT sales returns prepared
- *TRANSACTION FILE generated
- *Beta-Base compatible

This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Customer details can be automatically placed in a Beta-Base compatible file for use as a mailing list.

VAT details are generated at the end of the VAT period and the YEAR TO DATE figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.

A transaction file is generated for account customers for use with the STATEMENT and ACCOUNTS RECEIVABLE module.

Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. The Beta-Base Utilities Disc provides Mail-Merge facilities using the customer list.

This program was written for our own use and is used to prepare hundreds of invoices per week. We have made life as easy as possible for ourselves, so why not take advantage of our efforts.

Requires double sided single drive for minimum configuration - no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

40 80 3" 0 ________ DISC
40 ________ 40 TRACK
80 ________ 80 TRACK
3 ________ 3" DISC - ADD £3
________ EPROM

Send for detailed newsletter
All prices inclusive of VAT & Carriage - NO EXTRAS! Please state 40 or 80 track disc and state D.F.S. you use

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Euro micro is the aim

ACORN has begun a joint venture with Olivetti and French electronics group Thomson to define and develop a European standard for micros.

The three firms hope to eventually create a micro that will be the educational equivalent of what the IBM PC is to the business world.

This new machine will be manufactured by the partners either individually or on a joint venture basis.

Work has already started on the prime objectives of the enterprise – designing an acceptable operating system, user and hardware interfaces.

"This project is unique in that we shall be working backwards from the end user requirement instead of inventing a machine and then finding a market for it", Bob Coates, marketing director of Acorn's education, training and consumer division, told *The Micro User*.

"It is early days yet but I can state categorically that the end product of this joint venture will not be a rival to the BBC Micro.

"In accordance with our established policy, the new system will be upwardly compatible with our existing machines and we shall as a matter of course produce the necessary interface".

橡子電腦用戶之香港會

NOW HONG KONG HAS BBC USER SOCIETY

THE estimated 2,000 BBC Micro owners living in Hong Kong can now join their own Acorn Computer Users' Society.

The group already has more than 50 members and a monthly journal whose editor, Peter Dolwin, wrote to say that *The Micro User's* monthly appearance on news stands in the Crown Colony is an eagerly awaited event.

Members meet every month at the premises of Acorn distributor Brainchild Computers in a building known locally as the Amah's Tooth because of its gold tinted windows.

The range of interests represented include education, music, business, games and programming.

Guest speakers, including leading figures in the computer industry passing through Hong Kong, are invited to address the monthly meetings.

Recently Roger Broadie, former deputy director of the Microelectronics in Education Project spoke to the group.

The society receives full support from Acorn and Brainchild, and is able to offer its members a 25 per cent reduction in the cost of equipment necessary for them to connect to Hong Kong Telephone's Micronet service.

Contracts

Dolwin says Brainchild is working closely with Acorn Far East on a bid to win three major Hong Kong government contracts for the provision of micros for 105 schools, four teacher training colleges and the Institute of Language in Education.

Apart from its price, the BBC Micro has the advantage of a large range of educational software already available, proven flexibility in the educational environment and the ability to process Chinese characters, says Dolwin.

As it is the Hong Kong government's intention to introduce the selected machines to a large number of schools, the basic technique approach adopted will be similar to that of the UK where the computer is a training resource used mainly for interactive classwork rather than the heavy computer-aided instruction approach favoured in America.

The Chinese language processor is a new development that enables the BBC system to process Chinese text using the Wang system for representation of Chinese characters.

"One of the first programs I have seen using this system is one which teaches calligraphy.

"Students are taught how to construct and write Chinese characters using coloured strokes 'painted' on the screen", says Dolwin.

On the lighter side, he reports that when Acorn co-founder Herman Hauser recently visited Hong Kong to discuss the government schools contract he found time to learn to play the traditional noisy and frantic Chinese game mahjong – in only an hour.

"Perhaps Acornsoft will be bringing out a Mahjong game to complement their Japanese game called Go", says Dolwin.

Beta-Base booster

THE Beta-Base utilities disc from Clares Micro Supplies enhances the existing Beta-Base program for the BBC Micro.

There are eight utilities on the disc – transfer, search, mail merge, label printer, file sort on disc, file sort on twin drives, file compact and deletion, and file detail print. Price is £12.

Big band sound...

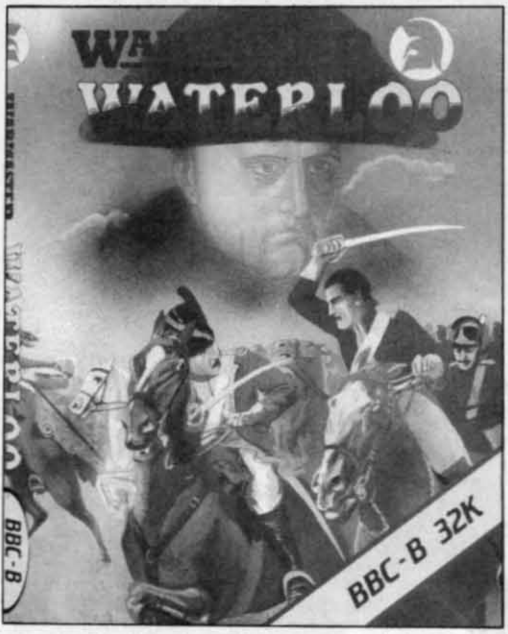
A SOFTWARE/audio system for the BBC Micro that takes the loneliness out of practising a musical instrument has been launched by a consortium of professional musicians and software writers called Music Play and Display Operating Systems.

Each twin cassette Micro-Maestro pack is tailored to suit a particular instrument or group of instruments and features contemporary music.

Learning musicians can practise with the program and, having gained confidence and ability, perform with full professional studio accompaniments.

The initial range has packages for keyboards, concert-pitch instruments, B-flat instruments and a recorder tutor.

The first three packs feature six popular contemporary tunes, the fourth is a condensed version of the Mupados recorder tutor used in primary schools. They cost £14.99 each.



Eprom programmer

A NEW eprom programmer has been released for the BBC Micro with disc drive by Cambridge Microelectronics. Functions of the BB-Prom include testing that the eprom is clean, reading its contents into a disc file, blowing the eprom from that file, comparing contents of both, and viewing data in memory.

Battle begins again

SOFTWARE house Lothlorien has launched the first in a projected series of realistic war games for the BBC Micro.

Waterloo is a one or two player graphic recreation of the famous battle, the main feature of which is simultaneous movement by both sides using keyboard or twin joysticks. It costs £12.95 on disc and £9.95 on cassette.

Early next year Lothlorien will bring out three war games on disc only. The first will be based on the English Civil War and will enable the war to be fought on both a strategic level around England and Wales and on a tactical level on the various battlefields.

The other two titles in the series will be World War I and Ancient Warfare.

MicroLink
in association with
TELECOM GOLD

No.4 December 1985

NEWSLETTER

Special interests groups

MANY MicroLink subscribers have been in touch to say they want to organise closed user groups within the system to promote their special interests.

Systems manager Colin Rogerson says MicroLink is only too happy to help out where possible and invites interested parties to phone him on 061-429 0788 for details.

In order to assess the depth of interest in specific CUGs, he suggests that anyone proposing to form a group should advertise the fact in the Contacts or Communications sections of the MemoPad facility.

"We have messages on the MemoPad now from people who want to form closed user groups for Commodore, QL, Atari, 68000 machines, and Telecom Gold enthusiasts", says Rogerson.

"The response to them will indicate the demand for such facilities and help us in planning to provide them".

THE FAMILY'S LINK

FIONA Simmons' sea captain husband Tony is nearing the end of a seven month voyage to the other side of the world and back.

But all the while his ship has been sailing round the Pacific Ocean he has been only seconds away from his wife and children in Derbyshire.

This remarkable feat of communications is made possible by Mrs Simmons' home micro and modem, the MicroLink electronic mail service and the international satellite system.She has been able to send and receive weekly telex messages that have kept the family in touch and eased the heartache of the long separation.

"The system lets us be in contact with each other much more than before", said Mrs Simmons.

"That is very important to me living in an isolated part of the country with my three young children".

"Not only do I feel closer to my husband while he's away, if any problem crops up here I know I can have the benefit of his advice within a short time via his ship's telex facility.

YOUR chance to join MicroLink – turn to Page 86

Oman connection

WHAT is helping to make MicroLink the fastest growing international electronic communications system is the remarkable way its fame is spreading around the world.

From the Sultanate of Oman, chartered engineer S.R.G. Rajan wrote to say how he had heard all sorts of good things about MicroLink and could he please become a subscriber. Rajan, general manager of the Oman Industrial Gas Company, is the latest of many subscribers in the Middle East.

Many yen for MicroLink...

ONE of the growing number of Japanese users of MicroLink, journalist Yuichi Ishikawa of 4 x 4 magazine, mailboxed from Tokyo to say how it has been saving him a lot of Yen lately.

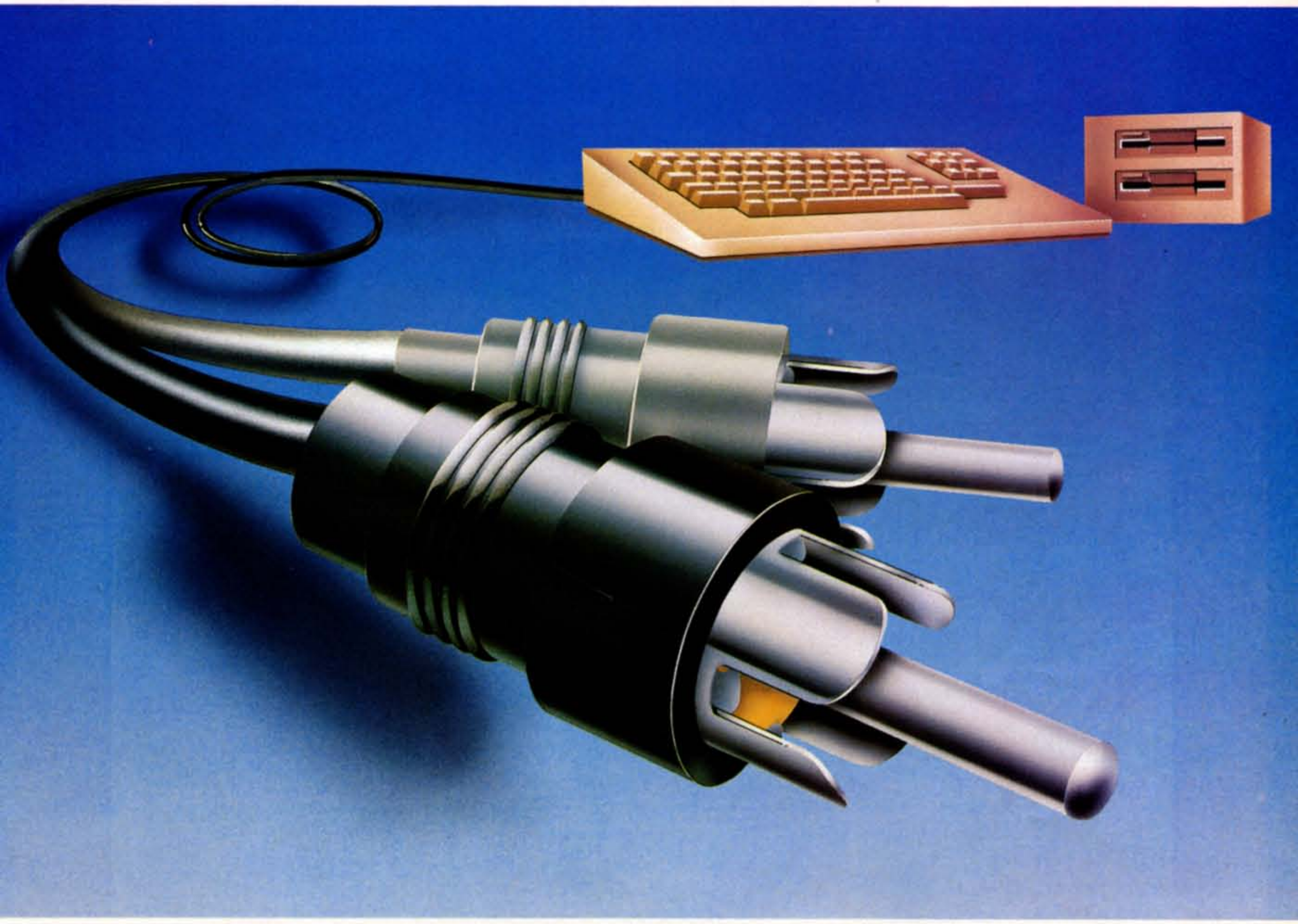
This is because he discovered that it is cheaper to send a telex to his contacts in Japan via MicroLink than it is to use the Japanese telex service. It means his messages have to travel from Tokyo to the MicroLink computer in London and then back to Tokyo!

Yet there is no appreciable delay in getting his message through – an essential requirement for a busy journalist battling against deadlines.

With the aid of Yuichi, MicroLink has even penetrated the bamboo curtain. He has regular telex correspondence with a contact in the Chinese capital Peking using MicroLink.

However Yuichi's active use of MicroLink is likely to be dwarfed by one of his neighbours – one of Japan's leading financial institutions, the Bank of Toyko, recently became a subscriber.

HOW DO YOU MAKE A COMPUTER SHARPER?



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A Philips personal monitor gets the very best out of your computer. It makes using your computer more rewarding as the definition and resolution gives the clear display you need.

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Philips personal monitors are suitable for virtually all personal and home computers. Just complete the coupon and we'll send you full information.

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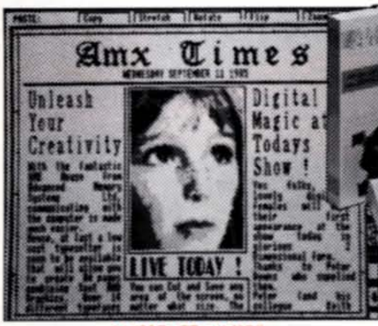
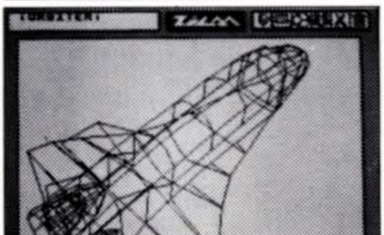
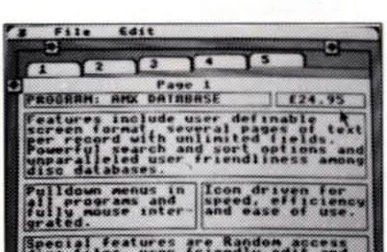


AMX PAGEMAKER
£49.95 INC VAT, 2 ROMS + DISC



AMX 3D ZICON
£24.95 INC VAT, DISC



Page 1
PROGRAM: AMX DATABASE £24.95

Features include user definable screen format, several pages of text per record with unlimited fields. Powerful search and sort options and unparalleled user friendliness among disc databases.

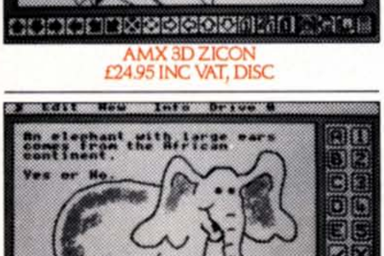
Pulldown menus in all programs and fully mouse integrated.

Icon driven for speed, efficiency and ease of use.

Special features are Random access disc files, user friendly edit and display with comprehensive and easy-to-follow manual and a 2Mb data capacity.

Available from : Advanced Memory Systems Ltd., of Warrington.

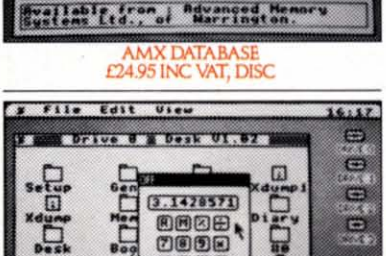
AMX DATABASE
£24.95 INC VAT, DISC



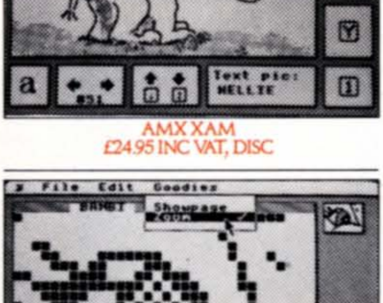
An elephant with large ears comes from the African continent.

Yes or No.

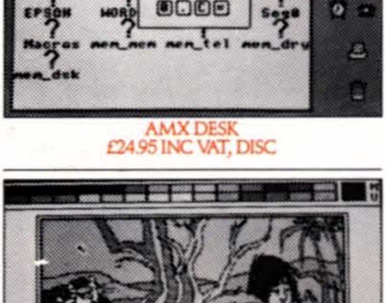
AMX XAM
£24.95 INC VAT, DISC



AMX DESK
£24.95 INC VAT, DISC



THE ORIGINAL AMX ART PLUS UTILITIES
£14.95 INC VAT, DISC



AMX PAINT POT
£14.95 INC VAT, DISC

From Advanced Memory Systems comes an irresistable selection of Icon driven software that AMX Mouse, ROM and AMX Super ROM owners can really get their teeth into!

Seven incredible programs, so comprehensive, they will more than satisfy even the most demanding BBC Micro user and when coupled with the AMX Mouse will broaden the horizons of the BBC Micro to new, undreamed of standards of sophistication.

AMX PAGEMAKER.

A fantastic high resolution A4 Typesetting and Artwork system.

Comprising 2 ROMS (8K and 16K) 'Pagemaker' features a fast scrolling A4 page.

There is a wide selection of typefaces and user definable fonts.

You can load in Wordwise and View files or type directly onto screen.

An incredible 'Cut and Paste' facility includes copying, rotating, stretching and zooming.

For the professional touch there is N L Q high quality dump, and you can dump any part of, or full A4 page.

AMX 3D ZICON.

Now, with a 3D ZICON you can transform three dimensional vector data and translate them into on-screen graphics.

You can Print or Plot graphics to suitable peripherals and produce output suitable for other AMX programs such as ART – UTILITIES and Paintpot.

There is even the facility to sketch in two dimensions and convert to three dimensions and auto swaps generator.

Some interesting example objects on file include – helicopter – jet plane and dodecahedron.

AMX DATABASE.

Database is a brand new super filing program featuring 1000 records and unlimited fields per record.

It has a powerful search and sort facility and user friendly edit and display.

In fact it is probably the most advanced user friendly database available today.

Special features include: User definable screen format for record display – random access files – super fast sort – flexible printer dump and screen display.

AMX XAM.

A brand new and exciting educational program with maximum flexibility, allowing a multitude of options and variations.

With XAM you can create a multiple choice exam which would not be alterable by the examinee.

And you can incorporate within the questions, your own pictures, created on AMX ART, building the finished picture into the quiz and providing an extra and fascinating aspect to the examination.

AMX DESK.

The complete home or office acquisition.

You will wonder how you ever managed without AMX Desk.

Just point your Mouse and select the following additional aids:

MEMO-PAD for up to three pages of text
TELEPHONE/ADDRESS BOOK with 200 or 400 scrolling entries
DIARY with three months calender
ALARM to remind you about appointments
CALCULATOR – Yes! A full function calculator that cannot be lost or suffer flat batteries, and any window can be dumped to your printer at the touch of a button.

THE ORIGINAL AMX ART PLUS UTILITIES.

Now available as a single package – two of AMX's most popular programs.

AMX ART is a superb mode 4 graphics program, making full use of windows, icons, menus and pointers, it allows you to create your own pictures and the host of graphic features in AMX UTILITIES including a fantastic zoom facility for accurate amendments to your ART pictures – one dot becomes a character.

You can also move, copy, rotate, reflect, enhance circles, draw ellipses and arcs, even print icons.

Border can be added and pictures stripped and centred for saving and printing. All pictures can be loaded into AMX PAGEMAKER, AMX 3D ZICON, AMX XAM, AMX PAINT POT, and AMX SUPER ART.

AMX PAINT POT.

The pictures you have created with AMX ART and enhanced with AMX Utilities can now be coloured in, using PAINT POT.

They will burst into life with rich, vibrant colours, and with a palette of 256 different shades you should not be short of inspiration.

You can even store up to 20 Illustrations in Picture Show mode, then display them in sequence.

To start you off we have included eight exciting pictures in the program.

AMX SOFTWARE

IMAGINATION AT YOUR FINGERTIPS.

ALL THESE EXCITING AMX ROM AND AMX SUPER ROM COMPATIBLE SOFTWARE PACKAGES ARE AVAILABLE FROM GOOD COMPUTER DEALERS OR BY SENDING CHEQUE TO PO TO FREEPOST ADVANCED MEMORY SYSTEMS LTD, GREEN LANE, APPLETON, WARRINGTON WA4 5NG.
FOR INSTANT ACCESS OR VISA ORDERS TELEPHONE (0925) 602959/602690.

We thought it was about time we put you in the picture.

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

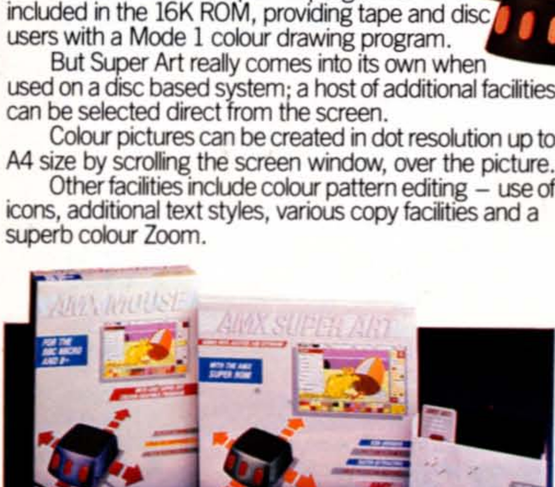
Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.



Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

Then you'll really be 'in the picture'.

AMX MOUSE

IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO FREEPOST ADVANCED MEMORY SYSTEMS LTD., GREEN LANE, APPLETON, WARRINGTON, WA4 5NG.

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CD352 2 x 40 track single sided 3½" disk drive	£179.95
*CSX351 1 x 40 track single sided 3½" disk drive	£ 59.95
*CDX352 2 x 40 track single sided 3½" disk drive	£109.95
Beta double density disk controller for Sinclair Spectrum	£ 49.95
MCP40 four colour plotter printer (limited quantity)	£ 59.95

*Excluding power supply (for BBC micro)
†Disk interface requires Acorn Plus 1 expansion unit
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....	CD352 disk drive(s) at	£179.95	☐
....	CSX351 disk drive(s) at	£ 59.95	☐
....	CDX352 disk drive(s) at	£109.95	☐
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BBC Model B + Econet + DFS	£399 (a)
BBC B PLUS	£409 (a)
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BBC Dust Cover	£4.50 (d)

UPGRADE KITS

Acorn DFS Kit	£80 (d)	1.2 OS ROM	£7.50 (d)
Econet Kit	£55 (d)	DNFS ROM	£17.50 (d)

BASIC II ROM with User Guide............................£22.50 (d)
1770 Upgrade Kit for BBC B to B plus.........................£42.60 (d)

ADFS is Acorn's long awaited double density disc interface system. The hierarchical filing system on the ADFS allows almost unlimited number of files. Treating a double sided disc drive as one drive allows storage of much larger files and greatly enhances the storage efficiency. Will read 40T discs on 80T drives.

ADFS ROM (for upgraded B's and all B plus)................£25.20 (d)

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Printer Server Rom	£41 (d)
File Server Level I	£75 (d)	10 Station Lead set	£26 (c)
File Server Level II	£210 (d)	Adv. Econet User Guide	£10 (d)

ACORN BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 48 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

BITSTICK I £310 (a)
ROBOCOM BITSTICK II: This bitstick comes with Bitstick I software upgraded to allow for auto dimensioning, scaling £795 (a)
ACORN's multiplotter driver for Bitstick graphics £79 (c)
(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick £35 (d)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive	£1299 (a)
30 Mbyte Winchester Drive	£1999 (a)

Add £200 to the cost if File Server Level III is to be installed.

ACORN 2nd PROCESSORS

The Z80 2nd Processor converts your BBC into a CP/M business computer. Complete with comprehensive free software. £340 (a)

The 6502 2nd Processor provides both an increase in speed and memory. £175 (a)

ACORN P-SYSTEM

Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. **P-System** £263 (b)

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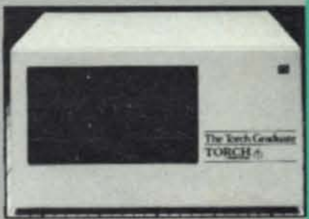
1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

EPROMs/RAMS

2764-25.......£2.20 (d) 27128-25.....£3.00 (d)
6264LP-15.........£4.00 (d)

TORCH PRODUCTS



GRADUATE: The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and dual drives, it simply connects through the 1 MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full feature word processor, a spreadsheet, a database and a business graphics all linkable.

Graduate G800/2....................£699 (a)
(Offer valid for limited period only).

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic....................£275 (a)
Z80 Disc Pack ZDP240 with software as above...............£550 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive.....£1.950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy..£3495 (a)

MULTI-FORM Z80 2nd PROCESSOR

This is a unique Z80 2nd processor running CP/M and allowing use of the massive range of CP/M software. What makes this unit rather special, is that it can be used with software from other CP/M computers, without the user needing specially configured software for the BBC. As supplied, the unit will read many formats and it is possible to configure the unit for virtually any other CP/M machine. Please contact us for further information.

Multi-form Z80 2nd Processor £299 (a)

META-ASSEMBLER

Both an editor and Macro-Assembler. Meta can assemble most 65xx, 68xx, 6804, 6805/6305, 6809, 8048, 8080/8085, Z80, 1802 and more. (Free updates due very soon — 68000 series, 8088/8086, Z8000 etc.) Many advanced features including Macros, conditional assembly, Global/selective search etc etc. Includes 16K Eprom, disc, function key card, and comprehensive manual. Please phone for comprehensive leaflet.. **Meta-Assembler** £126 (c)

MUSIC 500/SYMPHONY

Acorn's MUSIC 500 is a sophisticated music composition aid and sound effects generator. Phone for leaflet. **Music 500** £174 (a)
SYMPHONY KEYBOARD from ATPL is a professional 4 Octave keyboard with sophisticated software.
Symphony Keyboard £108 (a)
Synth-500 disc allows its use with Music-500 **Synth-500 Disc** £10(d)

TECHNOMATIC

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London NW10 1ED

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London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
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24 hour Viewdata Service 01-450 9764

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All prices ex VAT
Prices are subject to change without notice

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(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

PRINTERS

SPECIAL XMAS OFFER
EPSON FX80
£265 (a)
+ VAT

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

EPSON DOT MATRIX PRINTERS: EPSON — the high quality range of dot-matrix printers that set the standard in the industry. A wide range of interfaces ensure that these top-of-the-range printers can be used with most computers.

RX 80T + £210 (a) RX 100 + £345 (a)
FX80 + £315 (a) FX100 + £430 (a)

Epson LX-80 NLQ: A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed.

LX-80 £219 (a) Optional Tractor Feed £20 (c)

Epson JX80 ColourA full colour dot matrix printer with colour text and graphics as well as many advanced printer features.

JX80 Colour £475 (a)

KAGA NLQ PRINTERS
A top quality yet very competitively priced printer with a Near Letter Quality mode. Includes all the features of Epson FX and uses the same control codes. Extra socket provided on the pcb for installing either 8K RAM or 8K EPROM for custom made font.

KP810 (80 col) £235 (a) KP910 (156 col) £339 (a)

SEIKOSHA SP-10000
A low cost attractively packaged printer includes many novel features including NEAR LETTER QUALITY mode and automatic single sheet loading. Variety of fonts, 100 cps, both friction and tractor as standard.
Seikosha SP-1000 £189 (b)

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.
Buffalo 32K Buffer £75 (d)

DAISY WHEEL

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 £310 (a)

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 £299 (a)

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69 (c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers-x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea.)	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50 (c)

GRAPHICS PLOTTER

Basic 3 colour flat bed plotter £270 (a)
Opto Sensor £78 (d) Drill Router £79 (c)
Basic Plotter can be powered from BBC psu
External 12V psu £41 (c) External 12V psu (for drill router) £78 (c)

BREAK-LOCK

A two-position key switch, fitting into the 'Ash-tray', that prevents accidental/unauthorised use of the Break key. £8.50 (c)

PRINTER ACCESSORIES

EPSON
FX80 plus sheet feeder £129 (b); LX80 sheet feeder £49 (b)
Paper Roll Holder £17 (d) FX80 Tractor Attachment £37 (c)
Interfaces: 8143 RS232 £28 (c): 8148 RS232 + 2K £57 (c):
8132 Apple II £60 (c): 8165 IEEE + Cable £65 (c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00 (d):
RX/FX/MX 100 £10 (d): LX80 £6 (d)
Spare pens for HI80 £7.50/set (d)
KAGA TAXAN: RS 232 Interface + 2K buffer £78 (c):
Ribbon KP810/910 £6 (d)

JUKI: RS232 Interface £65 (c): Spare Daisy Wheel £14 (d):
Ribbon £2.50 (d);
Sheet Feeder £182 (a) Tractor Feed Attach £129 (a)

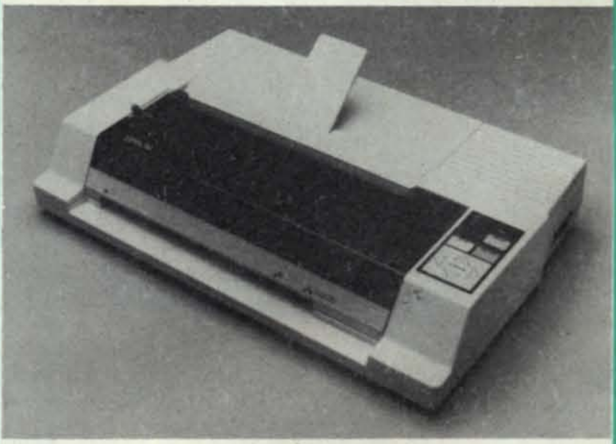
BROTHER HR15: Sheet Feeder £189 (a) Tractor Feed £99 (a)
Ribbons Carbon or Nylon £4.50 (d): Red Correction Ribbon £2 (d)

BBC Printer Lead: Parallel (42") £7 (d): Serial £7 (d)
Printer Leads can be supplied to any other length.

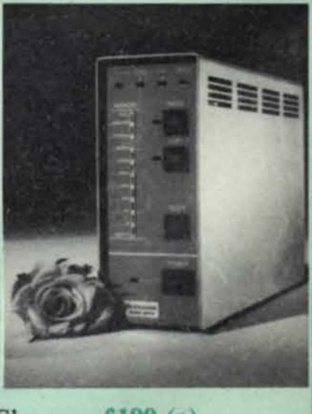
Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 Sheets 9.5" × 11" £13 (b) 2000 sheets 14.5" × 11" £18.50 (b)
Labels per 1000s: Single Row 3½" × 1 17/16" £5.25 (d)
Triple Row 2-7/16" × 1 7/16" £5.00 (d)
Dust Covers: FX80 £5.50 (d), FX100 £7.50 (d), Kaga KP810 £6 (d), KP910 £7 (D)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request.
Epson Hi-80 Plotter £345 (a)



PRINTER SHARER/BUFFER



A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer £199 (a)
BBC Cable Set £30

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		14" RGB with PAL & Audio	
1431 Std Res	£185 (a)	**1431** AP Std Res	£205 (a)
1451 Med Res	£240 (a)	**1451** AP Med Res	£280 (a)
1441 Hi Res	£385 (a)	These monitors can receive TV programs thru a Video Recorder	

Swivel Base for Plastic 14" Microvitecs £20 (c)

20" RGB with PAL & Audio

2030CS Std Res £380 (a) **2040CS** Hi Res £685 (a)

KAGA TAXAN 12" RGB

VISION II Hi Res £240 (a) **VISION III** Plus £330 (a)

SUPERVISION III Plus £360 (a)

MITSUBISHI 14" RGB Med RES IBM & BBC Compatible £229 (a)

SANYO CD3125NB 14" RGB Std Res £159 (a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90 (a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£95 (a)
KAGA KX1203A Hi Res 12" Etched Amber screen	£105 (a)
PHILIPS BM7502 12" Hi Res Green Screen	£75 (a)
PHILIPS BM7522 12" Hi Res Amber Screen	£79 (a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21 (c)
Monitor Plinth for the BBC	£13.50 (b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50 (b)

BBC Leads Kaga RGB £5(d) Microvitec £3.50 (d) Monochrome £3.50 (d)

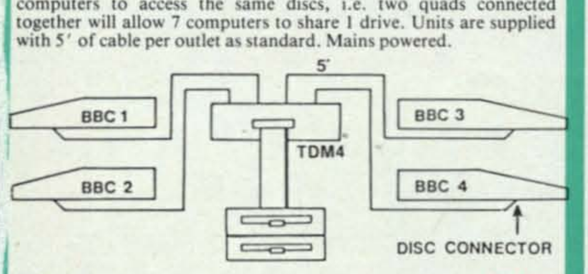
Multi Output Video Adaptor: Allows up to 4 RGB Monitors to be connected to the BBC. Fully buffered £48 (d)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. **Touchtec 501** £260 (b)

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)	£135 (a)
TDM2 Dual Unit (2 computers)	£75 (b)

DISC ACCESSORIES

Single Disc Cable £6 (d) Dual Disc Cable £8.50 (d)

DISC STORAGE CASES

10 Disc Library Case £1.80 (d) 30 Disc Case £6.00 (c)

LOCKABLE CASES

40 Discs £14 (c) 70 Discs £15 (c) [illegible] Discs £16 (c)

DISC DRIVES

TECHNOMATIC drives are fitted with high quality slimline Japanese mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

Single drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned in the front on dual drives to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.

Single Drives:			**With integral psu:**	
1 × 100K 40T SS	: **TS100**	£79(b)	**PS100**	£99 (b)
1 × 400K 80/40T DS	: **TS400**	£99 (b)	**PS400**	£120 (b)

Dual Drives: (with integral psu)

Stacked Versions:		Plinth Versions:	
PD800 2 × 400K 80/40T DS	£209(a)	**PD800P**	£245 (a)

3.5" Drives:

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS £99 (b) **TD35** 2 × 400K 80T DS £172 (b)

Separate cased power supply £20 (c)

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life. Discs in packs of 10:

5¼" DISCS

40 T SS DD £13 (d) 40 T DS DD £18 (d)
80 T SS DD £22 (d) 80 T DS DD £24 (d)

3½" DISCS

80 T SS DD £30 (d)
80 T DS DD £38 (d)

Egon Ronay's JUST A BITE Guide FREE with two special 10-boxes of 3M diskettes. Limited Offer

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits.

Floppiclene with 20 disposable cleaning kits. £14.50 (b)

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24 hour Viewdata
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Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COMMUNICATIONS

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000** £129 (c) BBC Serial Cable £7.

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30 (d).
BBC User Port cable (for modem control) £4.

SKI KIT (Allowing total control of the modem by your computer) £10.

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling £10.

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. £25 (d)

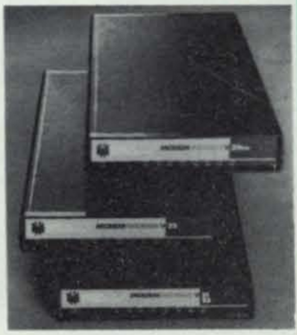
NEW WS-3000 RANGE — the new professional series. All are intelligent and 'Hayes' compatible, allowing simply 'English' commands to control its many features. All models feature Auto-Dial with 10 number memory, Auto-Answer, Speed Buffering, printer port, data security option etc. All models are factory upgradeable.

WS3000 V2123 (V21 & V23 + Bell) £295 (a)

WS3000 V22 (as above plus 1200 baud full duplex) £495 (a)

WS3000 V22bis (as above plus 2400 baud full duplex) £650 (a)

The WS3000 range all have BT approval.



BUZZ BOX This pocket sized BT approved modem complies with V21 300/300 baud and provides an ideal solution for communications between users, with mainframe computers and bulletin boards. Suitable for use with Open University computer. Battery/mains powered.
Buzz Box £60 (c) Mains Adaptor £10 (d) BBC Data Lead £8 (d)

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. Any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time clock. £27 (d)

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. £30 (d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £57 (d)

REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £29 (c)

time-warp
real-time clock

EPROMER II

EPROMER II
TECHNOMATIC LTD.

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass.
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.
- Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc £99 (b)
ROM based software £10

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59 (b)

UV1B as above but without the timer. £47 (b)

ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

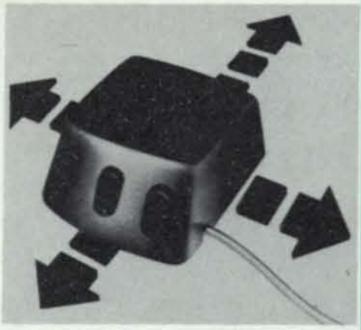
AIRES B32 RAM BOARD	£80 (d)
ARIES B12 ROM BOARD	£40 (d)
ARIES B12C Adaptor Board for B12	£7.50 (d)

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £39 (d) Battery Backup Kit £18 (d).

COMPUTER VILLAGE CV-16 Rom Board £42 (d)

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £86 (b)

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot resolution by scrolling the screen window. Other facilities include, colour pattern editing, use of icons, additional text styles, superb zoom in colour.

There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system.

AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics.

AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record.

AMXXAM This program enables you to create multiple choice exam papers which can include pictures created on ART, building the finished pictures into quiz etc.

AMX DESK and UTILITIES have already proved to be highly successful.

AMX Mouse with Super Art	£69 (d)
AMX Super Art Package on its own	£43 (d)
AMX PAGE MAKER	£43 (d)
AMX 3D ZICON Disc	£21 (d)
AMX XAM	£21 (d)
AMX DATABASE	£21 (d)
AMX Original ART + Utilities package	£11.50 (d)
AMX DESK	£21 (d)

ACORN TELETEXT ADAPTOR £192 (a)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282 (a)

DATABASE MANAGMENT SYSTEMS

GEMINI DATAGEM features include * almost unlimited file size (max 10Mbyte) * supports up to 4 drives * Max of 5000 records per file * max 6K record size * max of 62 fields * generates form letters from records.
Please ask for leaflet. £79 (c)

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £52 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £69 (d)

CLARES BETABASE £21.50 (d)

MASTERFILE II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW £16.50 (d) Disc (80 or 40T).

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors.

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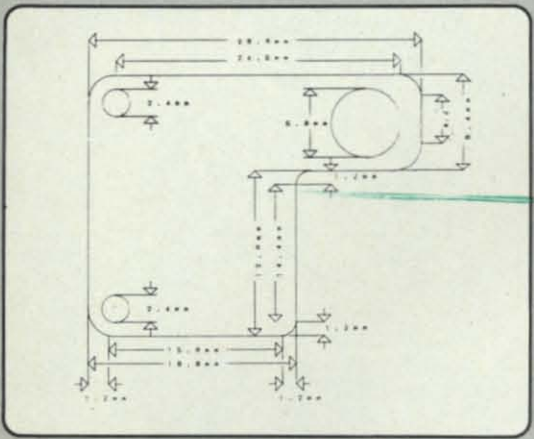

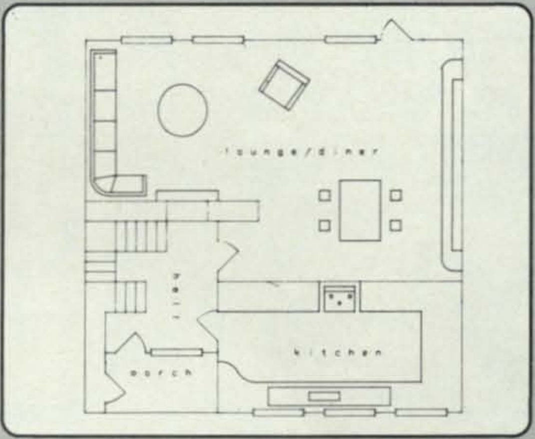

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- Horizontal and vertical displacements can be measured in any user defined scale.
- Any two colour can be used in mode 4.
- Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- Text can be added at any position vertically or horizontally.
- Use of 2nd processor will allow use of 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
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- Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.

NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

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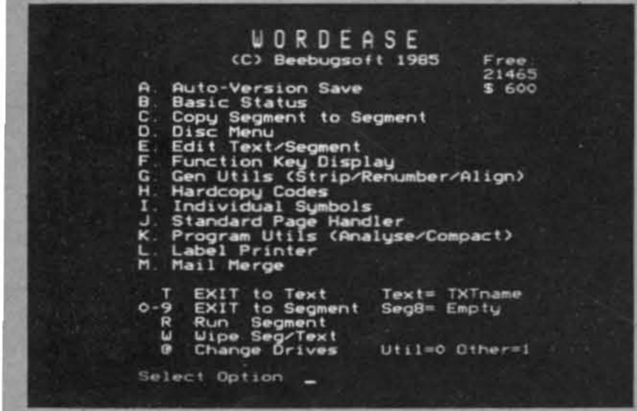

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                 W O R D E A S E
              (C) Beebugsoft 1985     Free
                                      21465
     A. Auto-Version Save             $ 600
     B. Basic Status
     C. Copy Segment to Segment
     D. Disc Menu
     E. Edit Text/Segment
     F. Function Key Display
     G. Gen Utils (Strip/Renumber/Align)
     H. Hardcopy Codes
     I. Individual Symbols
     J. Standard Page Handler
     K. Program Utils (Analyse/Compact)
     L. Label Printer
     M. Mail Merge

       T  EXIT to Text      Text= TXTname
     0-9  EXIT to Segment   Seg8= Empty
       R  Run  Segment
       W  Wipe Seg/Text
       @  Change Drives     Util=0 Other=1

     Select Option  _
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Three Stars from the East

MIKE MAHON looks over three new dot matrix printers

SD10
SG15
SG10

I SHOULD have known – three huge boxes outside the editor's office and I would end up lugging them over half of Manchester. Well, was it worth it? The answer is YES – a revelation in some areas and a slight disappointment in others.

The printers concerned are the Star SG-10, a budget priced 80 column dot matrix with NLQ (Near Letter Quality) mode, its wider (and more expensive) big brother the SG-15, and the faster, solid-as-a-rock SD-10.

Undoubtedly I would compare them to my, and many others, trusty workhorse the Epson FX-80 which already seemed to have most of the features I needed.

All the printers offered a full range of features including Pica and Elite typefaces, italics, emphasised and double strike for bolder print, condensed or enlarged characters, underline, superscript, subscript, proportional spacing, graphics mode and downloadable characters.

This is in addition to a great deal of control over line, tab and back spacing. Compared to the Epson it only lacked a reverse line feed option – a useful, if only occasionally used, feature.

Eight international character sets, where 11 characters vary between the languages, were available on all three printers – only one less than the Epson. Interestingly, it was the Japanese set which was lacking.

The shape of the characters was well formed with true descenders (see Figure I) and was identical to those of the Epson – not surprising as they all have a 9 by 11 dot matrix head.

A full 96 Ascii character set was supported by all devices. In normal mode the SG-10 and SD-10 could print 80 characters a line, though this could be varied from 40 to 136 by selecting other modes. The SG-15 printed 136 character lines in normal mode and could manage from 68 to a huge 233, which can be very useful for spreadsheets.

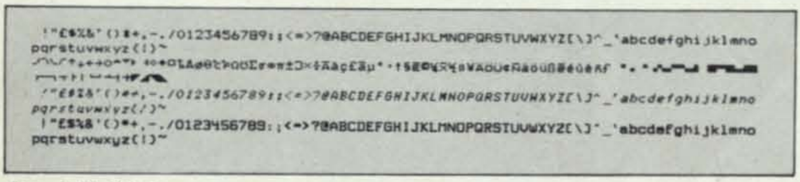
The SG printers appeared slightly less robust than the Epson, both having slightly flimsy smoked Perspex covers which almost fell off every time they were raised. However their performance was excellent.

The much heavier SD was more solidly built but had an extremely fussy cover which had to be closed "very properly" in order to trip a switch to allow printing.

The Stars were slightly noisier than the Epson in use, the loudest being the fastest – the SD.

In a rough test to print a standard page of word processed text the Epson took 44 seconds, the SGs 45 seconds, and the SD 34 seconds, which suggests

→



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 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
pqrstuvwxyz{|}~
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 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
pqrstuvwxyz{|}~
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Figure I: The full character set

From Page 43

that the SGs and Epson print around 100-120 characters per second and the SD 150-160. Thus all the printers were reasonably fast, as expected from modern bidirectional logic-seeking devices from Japan.

A good feature of the SGs was the readily accessible DIP switches on the outside which can be used for setting auto linefeed, Pica or Elite, downloadable characters, NLQ mode and so on.

These were less accessible on the SD, being almost underneath the ribbon, but nevertheless did not require any unscrewing of the case.

The two types of printer also differed in their ribbons. The SD had a standard Epson type cartridge ribbon which is quite easy to fit without getting too much ink on your hands. The SGs had spooled ribbons which had to be wound around 6 or 12 spindles in fitting – very messy.

Paper feeding on the Stars was both tractor (sprocketed paper) and/or friction feed. Paper widths from 4 to 10 inches (or 15 inches on the SG-15) could be catered for, and paper loading was much easier than on the Epson FX-80.

On the larger SG-15 paper could also be fed in through a special slot in the bottom of the machine.

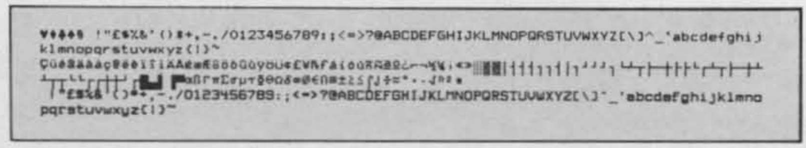
Unfortunately all the Star printers had one major drawback – the paper tear off point was so far away from the print head that approximately 12cm were wasted compared to the Epson's 1.5cm, and this usually meant a wasted page after every printout.

All the machines come with a standard Centronics parallel interface although optional serial RS232 interfaces can be added. They also have a generous 2k print buffer which could be expanded in some cases up to 16k.

Understanding the manual in order to get the thing to do its clever tricks is usually a major problem with these clever Japanese printers. The Star manuals were very good indeed, being around 230 pages long in A5 format.

Trouble was taken to explain things carefully, and decimal codes, useful for the Wordwise OC options, as well as the dreaded Escape codes, were covered. A pity though, that all the codes could not be included in the summary table or on a separate laminated card.

Now having covered the extensive, but nowadays ordinary, features of the



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♥♦♣♠§ !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghij
klmnopqrstuvwxyz{|}~
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 !"£$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
pqrstuvwxyz{|}~
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Figure II: Standard and IBM character sets

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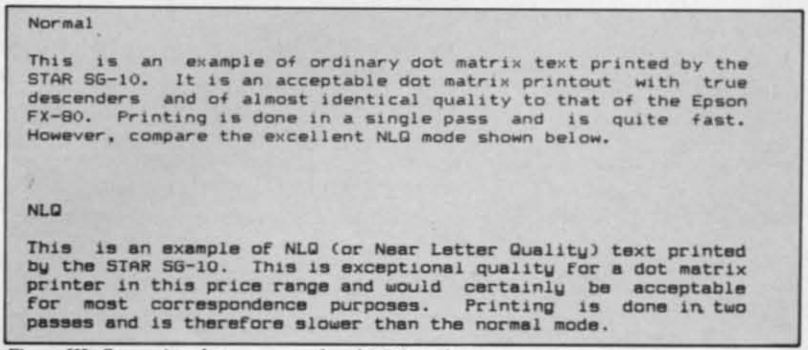

Normal

This is an example of ordinary dot matrix text printed by the STAR SG-10. It is an acceptable dot matrix printout with true descenders and of almost identical quality to that of the Epson FX-80. Printing is done in a single pass and is quite fast. However, compare the excellent NLQ mode shown below.

NLQ

This is an example of NLQ (or Near Letter Quality) text printed by the STAR SG-10. This is exceptional quality for a dot matrix printer in this price range and would certainly be acceptable for most correspondence purposes. Printing is done in two passes and is therefore slower than the normal mode.

Figure III: Comparison between normal and NLQ modes

Stars, what about their vital extras over the Epson? First of all they have an IBM mode to deal with that machine's – and its lookalikes' – different character set.

Not that I have an IBM mind you, but at least it's nice to know that I wouldn't have to change the printer if I decided to upgrade (downgrade?) to one.

The standard and IBM character sets as shown by the self test option are shown in Figure II. As you can see, a fair range of characters are available.

The Stars also have an excellent NLQ mode – see Figure III – which I think is of truly amazing quality especially when you think that the SG-10 is in the £250-£300 price range. The latter is obviously the major selling point over the older Epsons.

This mode required a double pass and was therefore slower than standard mode, but well worth the wait.

VERDICT: I was impressed with a number of features of the Stars, such as the NLQ and IBM modes, paper feeding, DIP switch positions, paper width options, the inbuilt buffer and, of course, the manuals.

The only features against were the poor paper tear off, ribbon replacement in the SGs and the fussy covers.

All in all, the Stars should make very good rivals to the Epsons, Kagas and Canons currently available – especially the cheaper, bottom-of-the-range SG-10.

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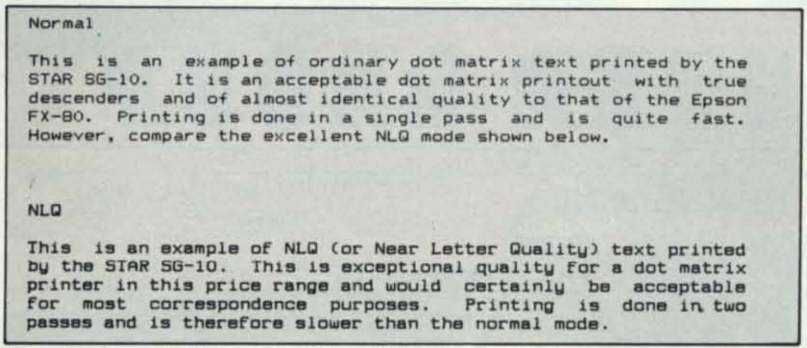

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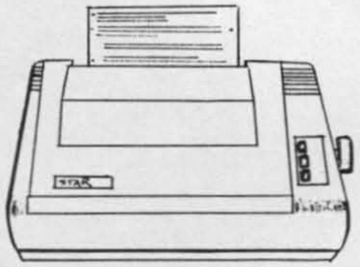

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GABRIEL JACOBS looks at and listens to Murom, the electronic successor to the "look no hands" piano

MUROM
Beebugsoft

EVER seen a pianola? It was a contraption, popular about 60 years ago, consisting of a pneumatically-driven piano controlled by a roll of punched paper. As the paper passed over a tracker bar, the piano appeared to play by itself.

Beebugsoft's 8k Murom is, in principle, an electronic pianola. The editing screen displays four columns, each representing one of the BBC Micro's sound channels.

Percussive noises can be entered into the first column and pitched notes into the other three by using either their standard letter names or part of the keyboard configured as a piano.

The panel of data scrolls by as you create the equivalent of your pianola roll. You then execute all the columns simultaneously with a *PLAY command.

Each column is divided into four sub-columns, indicating pitch, duration, octave (0-5) and envelope (1-16). These parameters can be set individually, or left for automatic entry at default values.

Notes are numbered, and the current number – that is, the note being edited – is displayed on the left of the screen.

The cursor can be moved horizontally, but remains vertically fixed on the middle line of the screen while the roll scrolls by – at lightning speed if you hold down the appropriate arrow key for fast forward or re-wind.

This static-cursor method means you always see the notes both immediately preceding and following the one being edited.

Most of the editing controls are implemented with single keystrokes. Note length, octave setting and envelope number, for example, are entered with the function keys.

Notes can be inserted and deleted with little fuss, and sections of music can be copied to other areas of the roll by specifying a destination note number.

Two genuinely interactive commands allow for a certain amount of creative editing. One enables single-stepping – sounding one or all the notes on the current editing line – and the other lets you change tempo setting while the music is playing.

Like its disc or cassette-based competitors, Murom is merely an interface between you and BBC Basic's SOUND and ENVELOPE statements, and any evalution of it must be partly based on how well it screens you from these beasts.

From this point of view, the pianola roll system – unique in current BBC Micro music software – is very much a plus.

Aligning notes is a daunting task at the level of BBC Basic, and difficult even with some of the available music editors. But on the Murom screen you actually see the duration of a note, not just a symbolic representation of it, which makes rhythmic adjustment comparatively easy.

It is unlikely that piano style notation will ever become the norm, even in the world of computers, for it has too many limitations for really serious use. But it is a workable system, allowing those who can't come to terms with standard musical notation to write music which can be easily read by themselves and others.

Murom's envelope editor is less impressive than its note editor. It has no graphic pitch display, and the amplitude graph can't be used dynamically – parameters have to be entered on a separate screen. For testing purposes, however, envelopes can be sounded at any time and their pitch altered interactively.

In addition to the basic editors, the program has a useful transposition facility, and a utility which generates two – admittedly crude – harmony lines for a given single-line melody.

It also has some interesting pre-defined envelopes and instant sounds – *HARP, *XYLO, *ZAP and so on. And, of course, all data can be loaded from and saved to disc or cassette and dumped to a printer.

One other feature deserves a special mention. Murom's use of interrupts means that music can be played back while your machine is performing operations such as printing, loading from cassette, or even running another program. No other relatively inexpensive editor offers this facility.

The ROM comes complete with a demonstration cassette containing about 15 minutes of music, a function key strip, a pocket reference card, and – as we have come to expect from Beebugsoft – a high quality instruction manual.

It includes worked examples and full technical appendices, and manages to explain everything in plain English without insulting the user's intelligence.

At £29 Murom is a little dearer than equivalent music systems available for the BBC Micro and whether you're willing to pay the price depends entirely on what you want.

It won't allow you to link files, or to specify repeats, but with so much RAM available for data, and the ability to copy blocks of music, you may never need such facilities.

Murom must occupy a high priority socket – or at least higher than a DFS chip – but data saved on disc or cassette can be played back without the ROM itself being present.

You can't print a file in standard musical notation, but Beebugsoft's whole approach has been to avoid sticks and blobs.

You takes your choice, and you pays your money.

And here IAN WHITMORE looks at the –

Tape to disc ultimate

Tape to Disc Transfer ROM
Vine Micros

WHEN I received the Tape to Disc Transfer ROM for review, I wondered whether it would fulfil the claims made by Vine Micros to be "the ultimate tape to disc system" – particularly as the word ultimate means last or utmost.

After reading the small handbook which accompanies the chip, I installed it in one of the sideways ROM sockets and set out to beat the challenge.

To be fair, the preface in the handbook does say: "While a very large number of programs can be successfully transferred using this system, there are always the odd few which cannot because of their devious protection methods".

Entering the only star command available on the ROM, *TD, or *TD N where N=drive No, presents you with a blue copyright heading and a readout of any files on disc in the TD format, that is, in the V. Directory. Any such files can be loaded by pressing the key corresponding to the letter preceding the title of the file.

Other options from this screen are a help screen, a facility to change drive or other parameters used in transferring programs from tape to disc, an option to reread the disc catalogue and entry to the transfer stage.

The transfer screen is at first daunting – see Figure I – but you quickly get used to being led by the messages in the section at the bottom.

First you provide a filename for storage on disc, then you are asked for the number of files in the program, if known. The tape is played and hey presto, it is loaded and transferred to disc, file by file.

The various areas on the screen contain data about the file being transferred, whether locked or not, and its various addresses. If you did not enter the number of files in the program it will prompt at the end of every file with: "Was that the last file?"

The ROM is very user friendly, giving sufficient help all along even to those who are not too familiar with computerese. I have used it with a number of cassette-based programs, including some that have proved very difficult to transfer either because of their length or software protection.

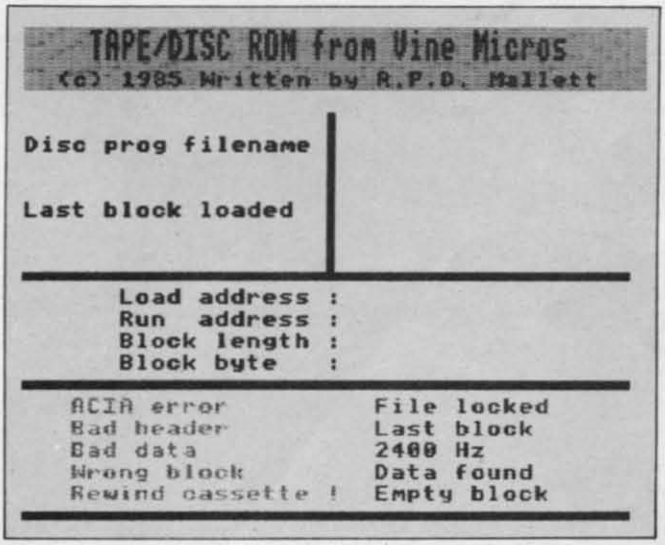
So far, it has transferred all of them successfully without having to resort to the slow loading facility or *RUNning them.

As one would expect, it is not possible to load the programs from disc without the TDROM. Vine Micros claim that each batch is different so that there is little likelihood of copying between owners of different TDROMs. If so – I was given only one to review – then this is a great stride in the direction of transfer without piracy.

Overall, this is a good buy but as it ties up a sideways ROM socket for one single function it does appear rather extravagant.

Perhaps if it contained a few simple disc utilities instead of all the Help data I could have recommended it more strongly. However, at the time I write it is "the ultimate" in terms of its transfer ability.

● *Vine Micros has since announced a double density version of the ROM suitable for the Opus 3.45 and Solidisk DDFS, working in single density.*



```
  TAPE/DISC ROM from Vine Micros
  (c) 1985 Written by R.P.D. Mallett

Disc prog filename

Last block loaded

        Load address  :
        Run  address  :
        Block length  :
        Block byte    :

     ACIA error            File locked
     Bad header            Last block
     Bad data              2400 Hz
     Wrong block           Data found
     Rewind cassette !     Empty block
```

Figure I

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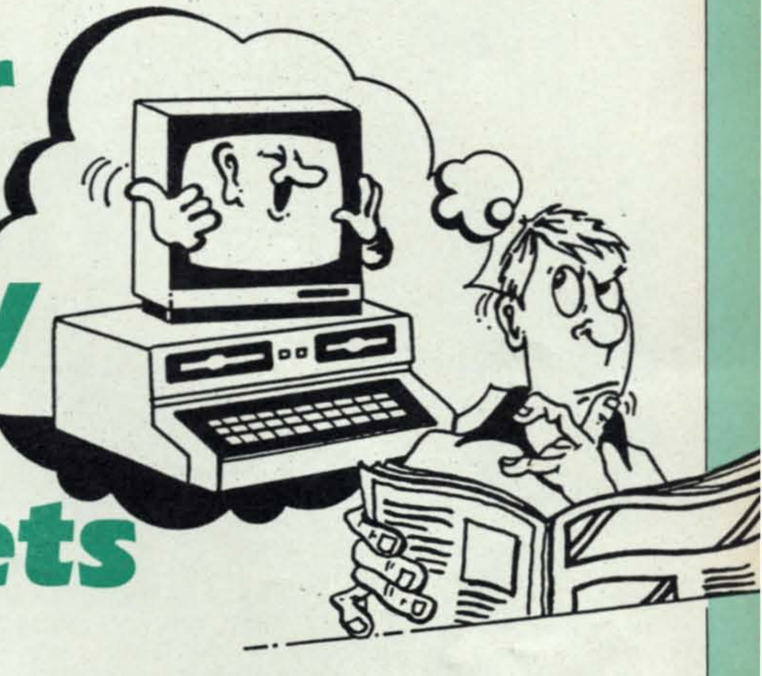
BEEBUG SOFT

Dumper makes memory give up its secrets



By KEVIN EDWARDS

DUMPER is an event-driven, hexadecimal dump routine which displays a section of memory on the screen while other programs, or languages, are being executed.

This means that you actually see what happens to different areas of memory while a Basic program is running, and find out something of how those magic ROMs do it all.

You can also gain some useful insights into why your own less-than-magic programs don't work!

The routine achieves this by making use of the BBC's powerful event facilities. Events are a form of interrupt that can be trapped and interrogated by a user routine.

There are several conditions that can cause an event interrupt. The most useful of these is the vertical sync or frame flyback event – event number 4. This occurs when the screen display is about to be redrawn, or more commonly known as refreshed.

The hexadecimal dump is displayed every fourth vertical sync due to processor overheads. Since the sync interrupt occurs every fiftieth of a second the screen is updated approximately 12 times each second.

This, obviously, ties the processor up for rather a long time since the event routine is quite complex. If the routine had been called every vertical sync the processor would spend most of its time displaying the hex bytes.

Dumper can only be used in two-colour modes, that is 0, 3, 4 and 6. In these each character requires only eight bytes of screen memory for its complete definition, rather like user defined characters where each pixel has a corresponding bit in the parameter bytes.

With such screen modes it is very easy to display characters by directly poking the screen memory with character data stored in the operating system ROM. The normal character print routine, OSWRCH, was not used because it is rather slow in comparison with a custom-written routine.

To allow Dumper to operate in all the two-colour modes several locations in Page 3 must be accessed to ensure that the routine executes correctly. For example, if the screen scrolls the top left screen address changes. Therefore, if the dump is displayed using the original start address the hex bytes will appear elsewhere on the screen. The locations used are described in Table I.

As you can see, each location provides us with some very useful information.

One of the first things the event routine does is examine &360. If a value not equal to 1 is returned the event routine is terminated. This is because the current screen mode isn't a two-colour one. If this check had been

&34E	High byte of the screen base address (the low byte is always zero).
&350,&351	Top left screen location (low then high).
&352,&353	Number of screen bytes per character row.
&354	High byte of the screen size (again the low byte is always 0).
&360	Number of colours available in the current mode minus 1.

Table I: Page 3 locations used by Dumper

From Page 51

left out the dump would be produced in a mode in which it couldn't be read – not very useful.

The next stage is to find the address of the top left corner of the screen (&350,&351). Now the memory base address and a defined number of hexadecimal bytes are displayed along with their Ascii equivalents.

Next, the start address of the current line and the number of bytes per character row (&352,&353) are added together. This moves us down to the start of the next character row where another row of hexadecimal bytes are displayed.

We repeat this process until all the lines have been displayed. The number of bytes and lines displayed can be altered – see lines 50 and 60.

When the screen address pointer is moved to the next character row we must also check if the address goes above &7FFF. If this is the case the screen size high byte (&354) is subtracted from the current screen address. This correction must be made to handle the wraparound effect of the screen display.

The most important part of Dumper is the routine which displays the characters on the screen. This is achieved by accessing the character definitions at the start of the operating system ROM – &C000.

Each character definition consists of eight bytes, starting with space (Ascii code 32) at &C000. Therefore, &C000 to &C007 contains character 32, &C008 to &C00F character 33 and so on.

All characters below 32 are special and don't have a corresponding visible character. Thus to access a particular set of bytes for a character with Ascii code n we use the equation:

```
base_address=&C000+((n-32)*8)
```

Using the calculated base address we read that and the next seven bytes to retrieve the required definition. This can then be stored in the screen memory to display the character.

Before an event routine can be implemented two things must be done. The first is to change the event vector at &220,&221 so that it points to the event handling routine. Next the required event must be enabled. For Dumper we're using event number 4 – vertical sync. The command we use for this is:

```
*FX 14,4
```

As soon as this is entered the next vertical sync interrupt will cause a "jump" to the address pointed to by the event vector – &220,&221. To ensure the event which caused the interrupt is number 4 we must also check that the accumulator contains 4. If it doesn't, another event has occurred and we leave the routine.

Once an event has been enabled the hexadecimal dump will be displayed until Break is pressed or the event is disabled. Changing to a mode other than 0, 3, 4 and 6 will also stop the hex dump being produced. Don't be fooled though, as soon as you re-enter a two colour mode the bytes will reappear.

Anyway, let's see how to use Dumper. First of all type in the listing and save it. As soon as you run it the object code is automatically saved with the filename DUMPER. Once this file is *RUNned the event vector is set up. Entering *FX 14,4 will then enable the sync event, and if you're in a two-colour mode the hexadecimal bytes appear.

If, for some reason, you wish to disable the event, you can do so with:

```
*FX 13,4
```

This is better than pressing Break as it doesn't reset the event vector.

The start address of the bytes displayed depends on the value of the integer variable *A%*, therefore entering something such as:

```
A%=&240
```

will instantly alter the base address to &240.

If you program f0 and f1 with *A%=A%–8* and *A%=A%+8* you'll be able to scroll through memory by pressing a single key. You can even alter *A%* in the middle of a Basic program.

If you're examining a program that scrolls the screen you may find it more advantageous to define a text window in the lower section of the screen.

Once Dumper is running you can begin exploring the BBC's memory. One of the first places worth examining is &700 – the Basic line input buffer. Try typing in the single line:

```
1 PRINT"HELLO":END
```

As you enter it you'll see the Ascii characters of the line being stored in memory. As soon as you press Return the two Basic keywords PRINT and END will be tokenised, or shortened, into a single byte. Basic does this to save memory because a keyword such as PRINT would require five bytes if it were stored in Ascii, but by using this tokenisation technique it can be reduced to one byte.

There's plenty more interesting sections of memory for you to explore – mainly below &900. So happy hunting.

Turn to Page 170

Switched-on lab data logger

I WAS very interested in your A/D converter, detailed in the April issue of *The Micro User*.

This would seem to provide the basis for an inexpensive laboratory data logger which I could use to measure batteries on quality control discharge tests.

In order that my system be fully automatic I also require a switching capability.

This is to limit the time a printer is switched on to the period once a day when readings are taken.

I also require to step a uniselector so that the voltage of a number of batteries may be recorded in turn.

As the A/D converter is connected to the user port of the computer, and requires a time clock, I assume it could not be connected to the user port extension using the 1MHz bus port given in the August 1984 *Micro User*.

Would I be able to use this port extension to switch mains voltage, and the uniselector, possibly with the early Body Building circuits, or would there be any incompatability with hardware or software?

I suppose I could always use the tape motor relay as one switch, but I would prefer to use as many ready built circuits as possible. – *B.D.H. Osborne, British Railways Board, Crewe.*

● **The digital voltmeter (April 1985) does not use any of the timers in the VIA of the user port. Even if it did it could still be used with the user port extension board (August 1984).**

If you had a timer you could switch the computer on and by making link 3 in the keyboard start-up options links. The computer would automatically run your program.

You can drive a uniselector in exactly the same way as the cassette relay (August 1983) only you would need a 12 volt supply.

Using the solid state relays (September 1983) you could also switch mains voltages.

No keyboard output

I DO a lot of typing on my BBC Micro. Now I feel I should give it a rest and let my typewriter do its job.

I have a Silver Reed EX 43N typewriter/printer – can you please tell me of a way to connect it to my micro (issue 3) so that the typewriter can act as a second keyboard, and I will still be able to use Wordwise? – *Dolores Rawlings, Weybridge.*

● **Sorry but the Silver Reed EX 43N does not output the key depressions and so it can't be used as a second keyboard.**

Switching drives

I AM deeply impressed by how you answer all the readers' technical problems and wonder if you could do the same for me.

I have recently purchased a single double sided disc drive.

I use it at many different places other than at my house where there is also a single drive.

When swapping our latest programming techniques we have to go to a lot of effort using a single drive.

I would like to find a way of altering the settings of my drive (telling the drive it is drives 1 and 3 or 0 and 2) by a flick of a switch – I do not want to have my drive switched to drives 1 and 3 permanently. – *Alister Hart, Chipperfield.*

● **Inside the drive there is a row of switches or links. These tell the drive which signal to respond to.**

If you open it up and look you will see it selected to drive 0. Undo this link or switch and make the one next to it, then your drive will respond to drives 1 and 3.

As there are only two drive select signals coming from the computer it is not possible to do anything more flexible.

Note that there will be a resistor pack in your drive – it might look like a ceramic IC. With two drives on the same cable this pack has to be removed from one drive.

Also the switch labelled MUX should be set on both drives. This removes any data signals when the drive is not being accessed.

Drive error message

SINCE I fitted an ATPL Sidewise ROM expansion board I'm getting a drive error message which translates to Late DMA which I understand stands for direct memory access.

I have a BBC B with 1.2 OS and Teac dual drive with own power source all of which are listed with *HELP. The DFS is the latest Amcom B series.

I had no trouble with a Teac single drive powered via the computer, before fitting the ATPL board.

Would appreciate any advice you may have. – *P.W. Bryant, Sidcup, Kent.*

● **Late DMA means that the disc controller chip was not read quickly enough to prevent data from the disc being lost.**

This is not directly connected with the ROM board, so I am puzzled as to the fault.

Try taking the board out and see if it clears it. If so you have a fault on the board or its installation.

DIY printer buffer

I READ your Body-Building course avidly each month, and much to my wife's distress try to pursue each idea as soon as she lets me have a few £s!

One idea you do not seem to have attempted, perhaps because it is too complex for us, is a printer buffer.

Personally I could use a small (about 16k) buffer, but the commercial ones are too expensive for me to justify. Can you

If you have a technical query for this page, send it to Mike Cook, The Micro User, Europa House, 68, Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 183.

From Page 53

oblige in due course?

Also what about a B+ upgrade like the B upgrade you did two years ago? – *Mike Temple, Glynneath, W. Glam.*

● **The trouble with a printer buffer is that you need extra memory. If it is static memory then it is expensive. If it is dynamic memory then you need some refresh circuitry.**

You then need some method of controlling the action. You can use logic or an extra microprocessor. Alternatively you can use software in the BBC Micro.

At the end of the day the results would not be significantly cheaper than the commercial devices.

One of the cheapest printer buffers is a ROM from Watford Electronics that converts any sideways RAM you might have into a printer buffer.

As to a B+ upgrade, just get a sideways ROM board and overlay RAM board like the Watford or Aries and you have virtually the functional equivalent.

Memory no answer

AS a relative newcomer to the BBC Micro, I would like to ask your advice as to the fitting of extra RAM and a ROM expansion card.

I have been informed by a colleague that the Watford Electronics 32k RAM board is compatible with Wordwise Plus, which is installed in my machine.

Having recently installed a Solidisk DFS ROM 2.0, along with the other necessary chips, I find that many long cassette-based programs, even with Page reset to &00, will not now run.

"No room" and "Bad Mode" messages are rife. Will the Watford 32k RAM card cure these problems?

I am wondering whether there is enough room in the computer to install both RAM and ROM boards together.

The June issue of *The Micro User* is the first copy that I have seen, and like it very much. – *Roger M. King, Castel, Guernsey.*

● **Many games make direct access to the computer's memory to achieve fast graphics.**

This technique will not work with the Watford or any other extra program RAM board, so you will not have a solution.

I think what is causing your trouble is the conflict between protected software and the non-standard Solidisk DFS.

It would not surprise me if they were not compatible with each other.

Losing its voice

I HAVE just installed one of your voice chip kits in my BBC B 1.2 OS, issue 7 main PCB, issue 1 key PCB and have a small problem.

The two chips themselves seem to operate OK without the edge connector ribbon cable connected, but when it is the voice function only lasts for about two minutes then only loud "mush" is heard.

The keyboard PCB modification tests out OK for continuity on its own, but the 6100 chip base IC98, minus the chip, shows a partial short between pins 13 and 14 – 14 and 15 when through to edge connector.

The upgrade instructions say there should be no shorts between any of these pins, but it seems to emanate from the original IC98 base.

I followed the sketch on Upgrade Instruction Book page 13 to add link 11, although the text on page 7 conflicts "link pin 14 on the edgecard connector to zero volts. This can be found on either of the capacitor legs nearest the centre of the PCB".

The page 13 sketch indicates the link must go to the farthest legs.

Your Figure IV in *Micro User* page 149 of March 1985 also conflicts, showing the link going to another point beyond the other end of pins 14.

Please suggest the most likely cause and cure. – *Gerry Wise, Reading.*

● **Sorry, I am stumped. Several others have complained of similar symptoms with the speech chip fitted.**

Disc capacitors do not fail like this and replacing them would be of no help.

As the system works for a short time it suggests something like a missing earth with the chip receiving power via one of the logic input pins.

This sometimes produces the effect of working for a short time after switch on.

Double stepping

I SAW the 80/40 switcher circuit in the October issue of Micro User. Unfortunately I have an old drive and it will not work with the link made as you suggested in your article. Therefore your circuit will not work. Have you any other suggestions of how to make an 80 track drive double step? – *J.M. Wright, Aberdeen.*

● **I have found that many old drives will work with my board despite not working with the link made. This is because the link reduces the stepping time to 6mS and also shortens the settling time. My board only requires the drive to respond to 12mS.**

I think it should work but to be on the safe side as a special offer you can order the pack ready built on sale or return.

If you return it within two weeks you can get a refund or even order the kit and save yourself some money. Be sure to specify sale or return.

My micro's a flasher

MY BBC Micro suffered from flashing on the screen. The Video Process IC 28 pin is marked Feranti ULA 5C094 – E – 3, 8219.

A local service centre supplied me with a 28 pin i.c. marked 404 V 2007, VC 2023, 201647 Acorn Computer, Korea – AE.

Could you tell me if this chip is a correct replacement for the faulty one? I fitted this new chip but on switch on I get black letters on a light background instead of the more usual white letters on a dark background. – *R. Wiseman, Walsall.*

● **The chip you have is version 2 of the ULA. This has the fault you described, a fault not found on the latest version 3.**

However there is a cure. You need to remove the S26 link and solder a wire from the centre pin to pin 1 of IC10.

Alternatively get your dealer to fit the latest version.

GOING INTO THE RED . . .

I WONDER if you could give me some advice about a display problem.

I have a fully upgraded BBC A, OS 1.2, fitted with an LVL DDFS, Acorn speech chips and a Watford ROM Board, (Wordwise Plus, Watford's Dumpout 3).

I have recently been having trouble with an intermittent fault that appears to be getting worse.

It occurs mainly on power up, when I find that the background colour in all modes except Mode 7 has changed to red instead of black.

When this first started happening I found that switching the computer off then on again would cure the display, but increasingly, this has no effect.

Predictably, when certain programs are run this colour change creates havoc.

About a year ago I misguidedly attempted to connect my micro to a Teletext TV, and succeeded only in giving it a beautiful monochrome display.

Luckily, replacing IC 48 managed to restore glowing colour.

Since my machine is two and a half years old I wondered if it might be showing signs of ULA failure. – *Geoff Roberts, Widnes.*

● **It does sound like the ULA chip or one of the video drivers. If it is intermittent it might just be a loose connector or socket.**

Try tapping the circuit board and see if you can get it to happen. Otherwise I suspect the ULA.

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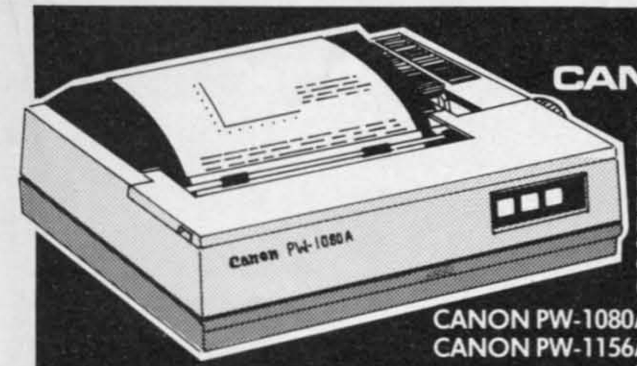

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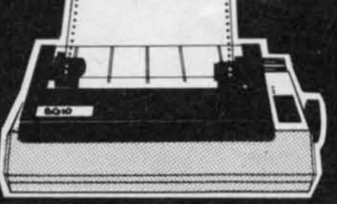

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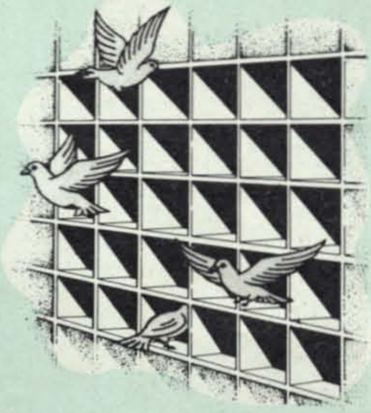

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(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £32

(Please specify 40T or 80T disc

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£67**

Continued →

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

**Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £59 and the Double Density Unit at £66.**

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20	1.43	1.53
	partial	Yes	Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£59**
- *Acorn's DFS Kit complete* **£60**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£60**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

The Watford Electronics DDFS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation. Just compare the features below with those offered by the Standard DFS:

- SINGLE or DOUBLE DENSITY operation. Double Density operation gives 80% more storage.

- Automatic detection of density for operations.
- 31 or 62 file catalogue with automatic catalogue size detection.
- Files can be up to FULL size of disc (360k) due to extension bit.
- Multiple file rename with FULL wildcards (even more powerful than those offered by the Standard DFS on it's *COPY operation!)
- *COPY with FULL wildcards; not the normal Acorn ones.
- Selective *COPY operation, with FULL wildcards.
- *COPY, *MOVE, *BACKUP, etc, over densities, 40/80.
- Status Display of open files (handle, full filename, pointer, extent and access type).
- Close all open files with a single * command.
- Built in single and double density verify routine.
- Built in single and double density sector editor.
- Read and WRITE in 40 track discs on 80 track drives.
- 40/80 switching drive independent.
- 40/80 switching automatically performed if needed.
- Built in formatter allows for mixing of density, catalogue size, 40/80 track and 40/80 switching.
- MLOAD and MRUN commands help run tape files from disc.
- Econet Level II file server capability Econet work station capability.
- Extremely powerful 8271 emulation for loading games, etc.
- Comprehensive OSWORD &7F emulation.
- Default filename system, useful for program development.
- Full width wide catalogue display in 80 column modes.
- Extended *LIB specifications.
- Optional preceding letter on * commands to avoid ROM clashes.
- List of sector gaps unused on disc.
- Full retention of open files over Break.
- Full retention of drive settings over Break.
- Full retention density settings over Break.
- Extended read filenames (via extended OSGBPB functions).
- Automatic sector skewing during formatting.
- Assumes last density for next disc access for speed.
- Read drive of last *RUN / *LOAD operation.
- Load ambiguous filename for convenience.
- Improved space allocation for OPENOUT.
- Invalid execution address (&FFFFFFFF) in *RUN causes *EXEC of file.
- Extended *HELP implementation shows syntax of individual commands.
- Extended error checking on operations.
- Catalogue shows number of files in catalogue.
- 40/80 stepping state displayed in çatalogue.
- Catalogue shows catalogue size.
- Catalogue shows number of tracks.
- Default filename displayed in catalogue.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £35 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

BBC B+ DDFS **£35**
(Price includes comprehensive
manual)

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

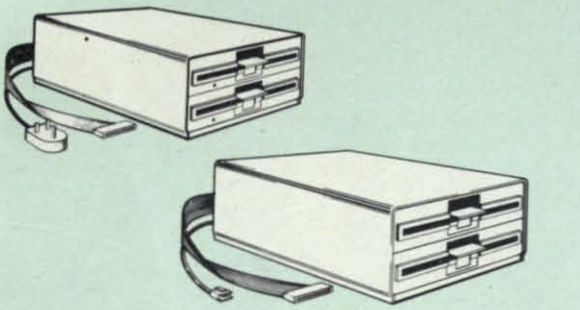
With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £76		CS100 £99	
200K (360K)	CLS 200 £76	CLD200 £145	CS 200 £99	CD200 £145
400K (720K)	CLS 400 £78 £79 CLS400S	CLD 400 £145	CS 400 £78 £79 CS 400S	CD400 £145
800K (1.44M)		CLD800 £158 £159 CLD 800S		CD 800 £158 £159 CD 800S
Securicor carriage on Disc Drives £5				

Prefix *C = Cased Drive*
L = Less PSU
S = Single
D = Double

Suffix *S = 40/80 Switchable*

e.g. *CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	**£13**
● *10 × 5¼" D/S D/D 40 Track Diskettes*	**£18**
● *10 × 5¼" S/S D/D 80 Track Diskettes*	**£22**
● *10 × 5¼" D/S D/D 80 Track Diskettes*	**£24**
● *10 × 3" S/S D/D 40/80 track Discs*	**£37**
● *10 × 3" D/D D/D 40/80 track Discs*	**£45**

Buy 2 packs of any of the above Diskettes & qualify for a FREE Egon Ronay's '"JUST A BITE" Guide.

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 ×* **M4** *S-S D/D 40 Track Discs*	**£11**
● *10 ×* **M5** *D/S D/D 40 Track Discs*	**£14**
● *10 ×* **M7** *D/S D/D 80 Track Discs*	**£19**

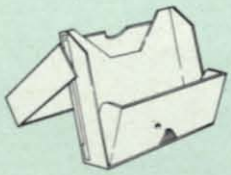
DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs	**£10**
M85 – holds upto 95 discs	**£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. **£8**

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20**	Twin (without PSU) **£3.85**
Single (with PSU) **£3.25**	Twin (with PSU) **£3.90**

Continued →

EPSON NLQ ROM
for the BBC Micro
ABCDEFGHIJKLMNOPQRSTUVWXYZ
A B
R S

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS **£15**

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)
Now available . . .
Centronics GLP printer, additional font ROMs. Price **£15**
(Please write in for full details).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, etc. etc.
Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR 2.1 .... **£46**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)	**£49**
VIEWSTORE	**£52**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

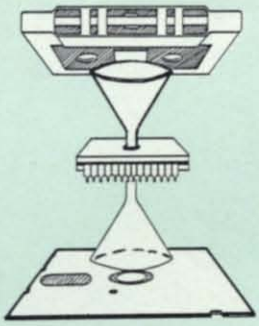
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

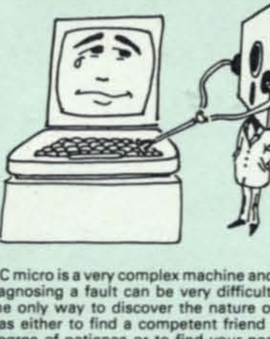
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£22.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

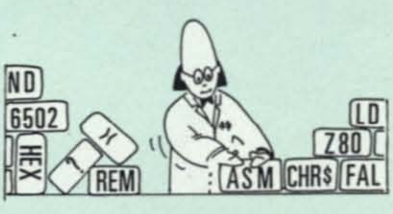
Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £18.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!



ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ROMSPELL
ENGLISH DICTIONARY

ROM-SPELL is probably THE most advanced spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all!".

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

£24

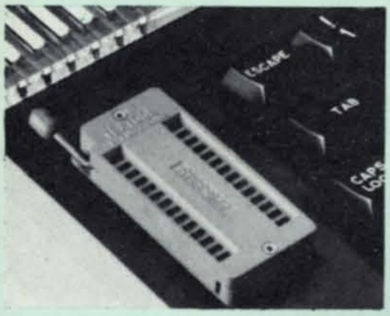
DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£16**

Please write in for technical details.

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Writes in &8000 to &BFFF region go to RAM.
- Assemble and *LOAD ROMs straight in to RAM.
- Supplied with utilities software disc.

Introductory offer: **£29**

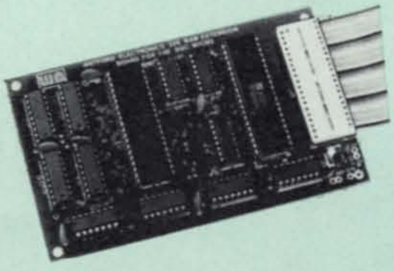
Optional extras

READ and WRITE protect Switches **£2**
BATTERY BACKUP £2

32K RAM-

PRINTER BUFFER

EXPANSION BOARD



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only 12K Buffer can be used in Wordwise or Wordwise+ because of the way these softwares are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Offer price

Only: £59

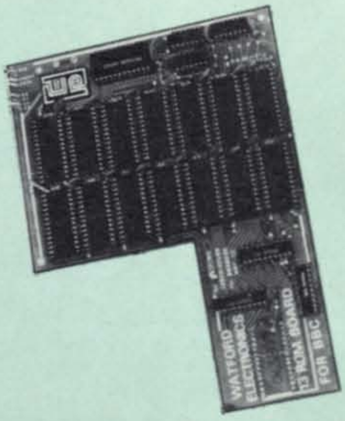
(Price includes a comprehensive manual and the ROM)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£60** (£3 carr)

Mk-3 13 ROM SOCKET EXPANSION BOARD



- Increase BBCs capacity for ROMs from 4 to 16.
- Easy installation; simply plug in with only 5 wires to solder.
- Minimal space needed.
- Compatible with our DDFS, RAM Card, Torch card, 2nd Processors, etc.
- Advanced low power chips keeps power consumption to a minimum.
- Very versatile Socket 14 can take 2716, 2732, 2764, 27128, 6116 and 6264 chips.
- *LOADs or writes in the region &8000 to &BFFF are automatically directed at the RAM.
- Auto-write protect line makes RAM look like ROM.
- READ protect line which makes socket 14 "vanish" – useful to get out of software crashes.
- On-board battery back-up option with a high speed charging circuit.
- Supplied ready-built and tested, complete with fitting instructions.

Price: Still Only £30

SOLDERLESS SIDEWAYS ROM SOCKET BOARD

Following the success of our 13 ROM SOCKET BOARD, we are proud to announce a new addition to our range – the New Solderless Sideways ROM Socket Board.

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expans the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£35**

Watford ROM/RAM CARD

A must for all serious users

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- Fast *BACKUP via sideways RAM.
- ROM to RAM load and save facilities.

The RFS (FAM FILING SYSTEM) can utilise up to the full 128k of RAM (with the RFS in CMOS RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£45
● ROM/RAM card with 64k dynamic RAM	£69
● ROM/RAM card with a massive 128k dynamic RAM	£109

OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● Battery backup	£2
● Read and Write protect switches	£2
Complete ROM/RAM board (all options installed)	£125

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful Worldwide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple *COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*

- *BT Approval applied for.*

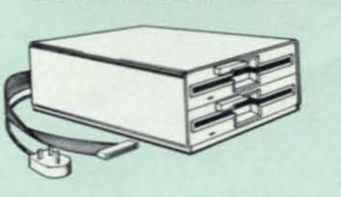
Launch Price: Only **£89** (carr £3)

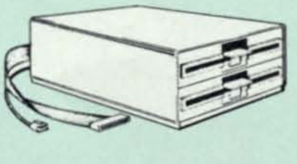
(Price includes Software ROM, Cables and Manual)

CHRISTMAS GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5; £10 & £15 denominations and are an ideal answer when faced with that problem of what to give for that special Birthday/Christmas gift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

CHRISTMAS DISC DRIVE OFFER





Watford Electronics has always been renowned for bringing high quality products to the consumer at realistic prices.

For the Christmas period, Watford is offering an even better deal on their top quality slimline MITSUBISHI DISC DRIVES for the BBC micro.

Packaged in matching decor the BBC micro, these superb disc drives are an ideal complement to any DFS on the BBC. Backed by a twelve month warranty from Watford, UK's largest distributors of BBC micro peripherals. You can be sure of a great deal from Watford.

The following 40/80 track switchable Disc Drives are being offered at rock bottom prices. The price includes a Utilities Disc. (For technical specification, please see the opposite page.)

● CLS400S Single 40/80 track switchable Disc Drive, cased with cables	£79
● CLD800S Twin 40/80 track switchable Disc Drives cased with cables	£159
● CS400S Single 40/80 track switchable Disc Drive cased with cables & Power Supply	£79
● CD800S Twin 40/80 track switchable Disc Drives cased with cables & Power Supply	£159

BUY NOW & SAVE £ £ss . . .

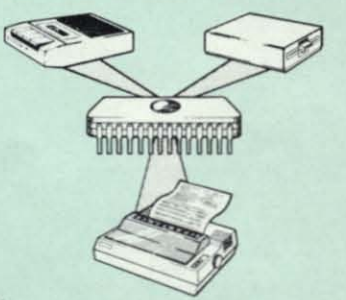
LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

PCB NI-CAD Battery for ROM Boards. £2

BUFFER & BACKUP ROM



For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

- ★ 4K or 16K buffer for parallel printer.
- ★ Dumps selection of Disc files to Tape.
- ★ Makes backup copies of tapes on to tape and disc.
- ★ Displays contents of paged ROMs on screen.
- ★ Menu display of ROM filing system contents on Shift-Break.
- ★ Comprehensive manual.

Only £20

LUCKY 13

To celebrate our 13th Birthday we will be offering some sensational bargains at the Electron & BBC Micro User Show on November 14-17.

SEE YOU AT THE SHOW

Nazir

NAZIR P. JESSA

See us at the ELECTRON & BBC MICRO USER SHOW New Horticultural Hall London SW1, Nov. 14-17

Continued →

Marconi TRACKER BALL

This popular Marconi's RB2 tracker ball now available with the popular Micro-Draw software.

Only: **£49**

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£52**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£26**
Disc Doctor ROM	**£26**
INTER-SHEET	**£45**
INTERCHART	**£34**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: **£32**

WORDWISE PLUS £46

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £15, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Price; Only **£16**

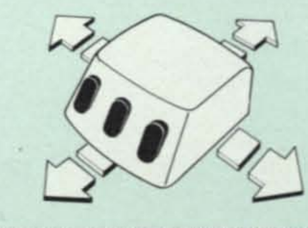
EPSON HI-80 PLOTTER

The latest addition to the popular range of EPSON Printers/Plotters. Prints in upto 10 colours. Has many more features. Please write in for spec sheet.

£345 (£7 carr.)

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £67.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

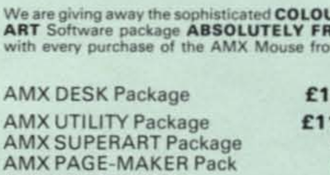
COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

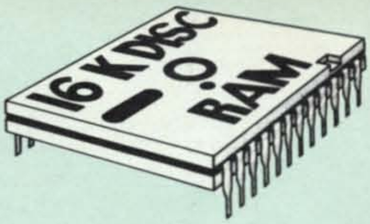
(please specify 40 or 80 track disc when ordering)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)



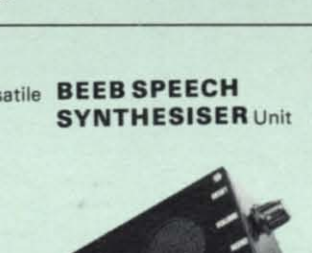
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
100 Programs for BBC Micro	£6.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
68000 Assembly Lang. Programming	£19
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£**XXX**
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£9.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Assembly Language	£7.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Games Master	£5.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
BBC User Guide	£10.00
BBC Wargaming	£8.95
Basic Programming on BBC Micro	£5.95
BCPL User Guide	£15
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
Computing for All the Family	£6.45
CP/M Bible	£16.00
CP/M Handbook with MPM	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Disc System for the BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
Easy Programming for the BBC Micro	£5.95
Electron Machine Code for Beginners	£6.95
Exploiting BBC Basic	£6.95
Exploring FORTH	£6.95
Filing System & Databases	£7.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphics for Children	£7.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Hackers Handbook	£4.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing Projects for the BBC	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£16.50
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP, A Beginners Guide to	£10.95
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Micronet Handbook	£6.95
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

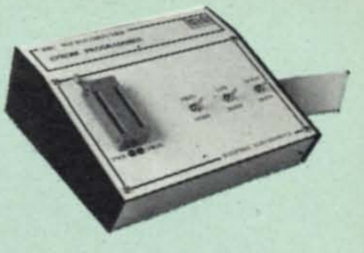
- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£95 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
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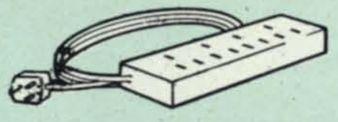

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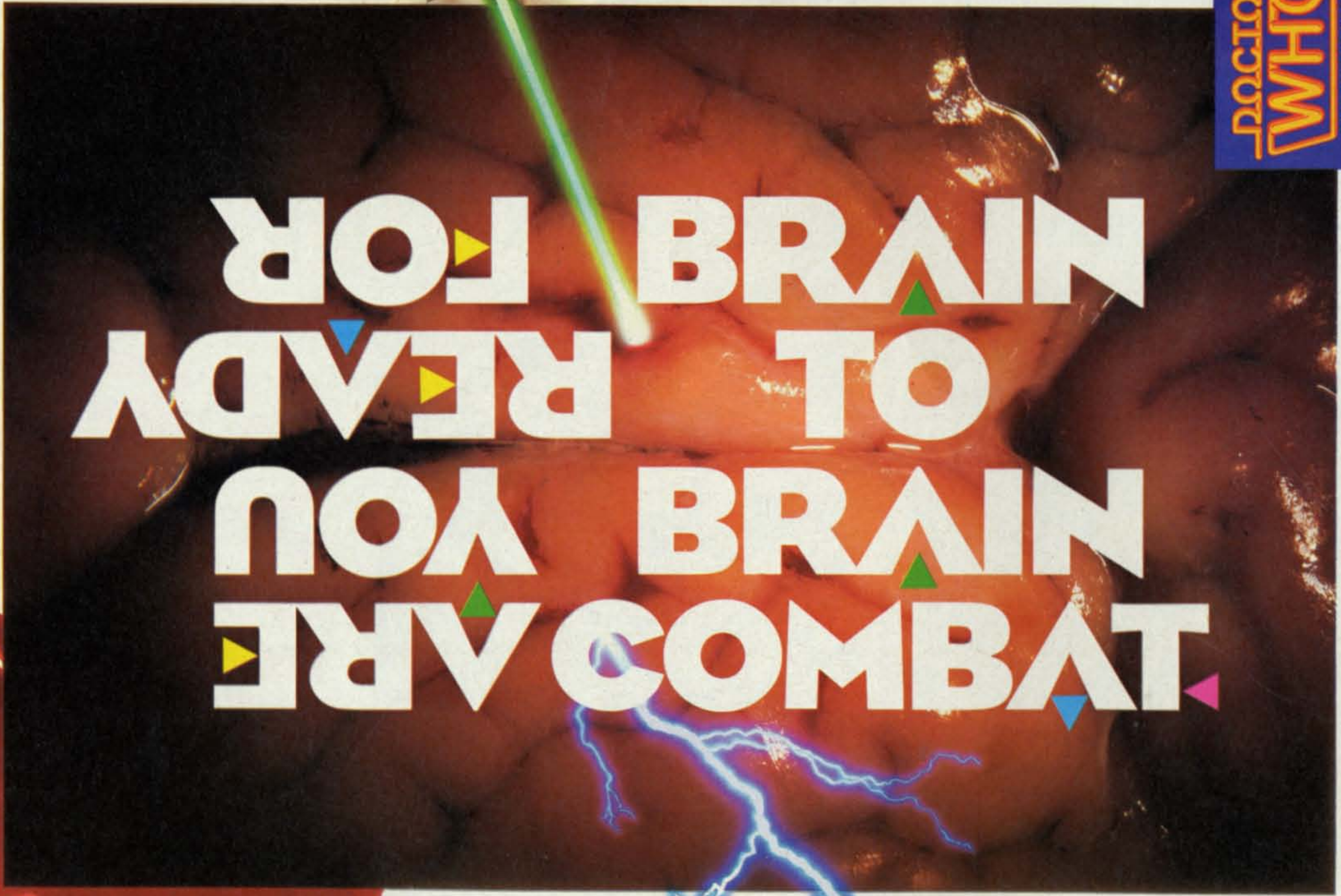
= C/h A os weapon. ⊲ *The Master reports 'promising' results.* (LIVE ALIEN *cortical preparation.*) ○ Mine/Factory *S*[illegible] *substantial* [illegible] { Heatonite

Machine skill VITAL. Doctor: ultimate risk scenario. Your intervention urgently requested. *???* HELP? *??? Disable TIRI* [illegible] ◀ *Regain*

FORM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WIZARD'S CASTLE

Asks PAUL HOBSON

IN this game, you play the part of an explorer who has accepted the task of rescuing the Lord and Master's diamond. It is the source of all the magic of the valley and has been stolen by the local evil Wizard and hidden away in his castle.

After a hectic struggle with foul beasts of the night, you manage finally to penetrate the thick jungle surrounding the Wizard's castle.

Climbing through a gap in the wall you find yourself at the bottom of a strong vine. Bravely you haul yourself up and climb through a trapdoor and find yourself in the middle of the Wizard's foul den.

Suddenly, in a puff of smoke, the trapdoor you have climbed through vanishes. An eerie laugh penetrates through to the furthest corners of the castle, and a voice thunders: "You miserable wretch . . . You think yourself capable of defeating me? Now you will face my guardians".

You quickly realise that your only hope is to find the diamond and use its magic powers to escape the labyrinth.

You run forward, turn to the left, and run through some rooms. You reach a room with "Treasure Store" adorning the cyan door and tug frantically at the handle. Alas, it is locked . . .

The foul Wizard's laugh fills the air yet again, and, as you watch in horror, horrid creatures materialise all around you, thirsting after your blood . . .

So you, as the explorer, must wander the castle in search of the cyan key to open the door of that colour.

There are seven keys in all, each unlocking doors that share their colours – and there are lots of locked doors. There are also some which you may only pass through one way.

To help you there are potions which give you extra lives and acorns made from precious metals for you to collect for points. Once you have the diamond – to the immediate right of where you start – you can escape the castle and win.

There are four floors with 64 rooms on each floor, and you will have to explore much of this before you can win the game. But the higher you go, the faster the monsters become.

To defend yourself, you are able to cast spells which appear as balls of fire. These ricochet around the room destroying whatever lies in their path – except you. Note that after the monsters first appear, they lie dormant for a couple of seconds recovering from the transportation spell the Wizard used to bring them into the castle.

KEYS

Z Move left **X** Move right
: Move up **/** Move down
Return Casts a spell

Objects are picked up automatically and used whenever necessary. There is no joystick option, but it could be added by patching OSBYTE 129 – the October, 1983 issue of *The Micro User* shows the technique.

Loading the program: When you have typed in the program, save it to tape or disc *before running it*. Then you can try to run it.

If the program reports "error in line nnnn" you have made a typing error in the data statements, which are checksummed.

If you get as far as the title page you must reload the program before re-saving it as some of the program is deleted when it is run, to make room for the Mode 5 screen.

It is advisable to check your typing very carefully if you own a tape system, otherwise you can spend a lot of time saving and loading the program if you are an inaccurate typist.

If you find that the monster sprites move too fast, you need only make one slight alteration. In line 610, adding any number from 1 upwards to the variable *LV* in the statement:

```
?&8D=LV
```

will slow down their movement relative to the number added.

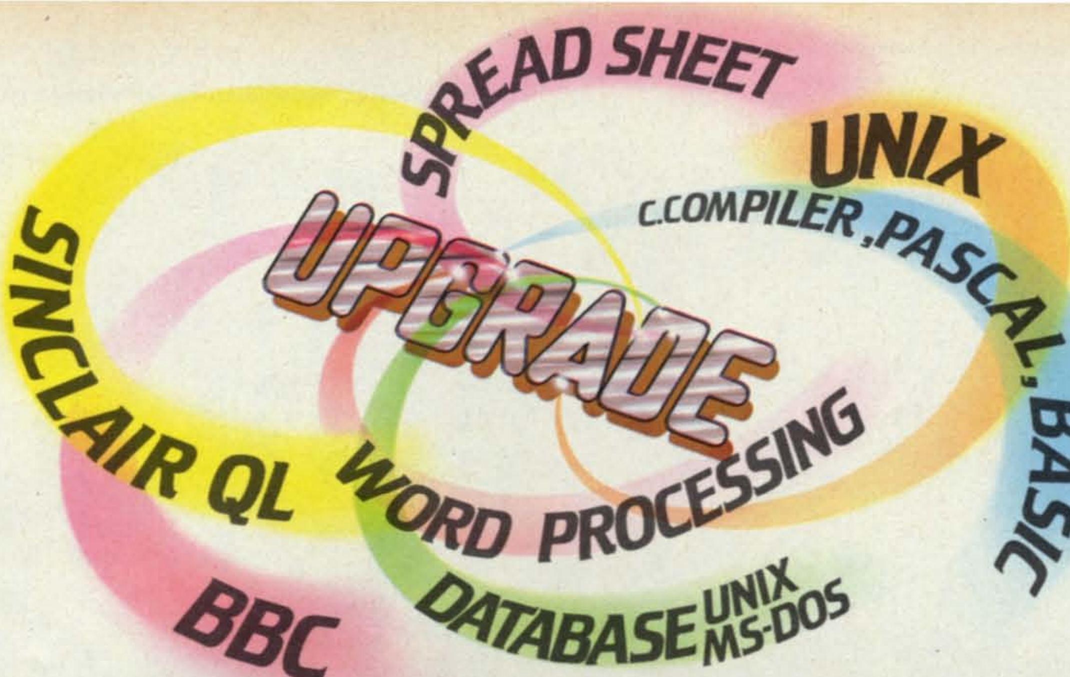
MACHINE CODE ENTRY POINTS

4F00	Plots the cave room.
4F03	Plots the square room.
4F06	Plots sprite at position according to xc, yc . . . (sprite number in X).
4F09	Main game loop – returns in accumulator: A=1 player has left the room. A=2 player has hit the key/acorn/life. A=3 player has hit a monster.
4F0C	Plot door type A on side X.
4F12	EOR plot character A at coords X,Y.

VARIABLES

H$(8),H(8)	High score table data.
ROOM	Current room number (0-255).
score	Your score.
WIN	Flag for completed game.
lives	Number of lives left.
keys	A 7 byte data table.
keys?n	Non-zero if the player has key n.

Listing starts on Page 156



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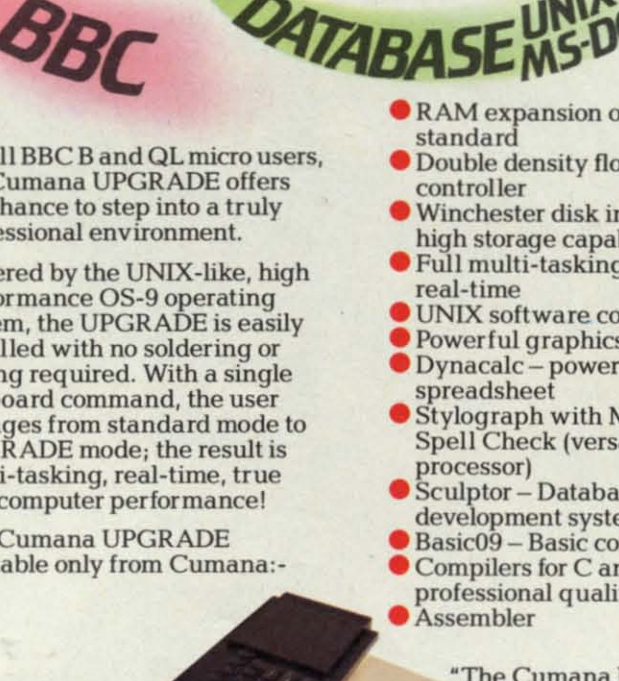

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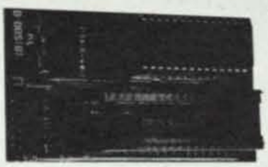

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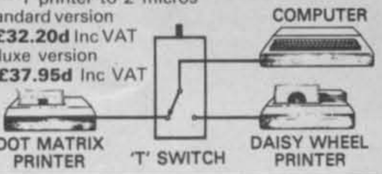

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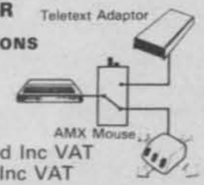

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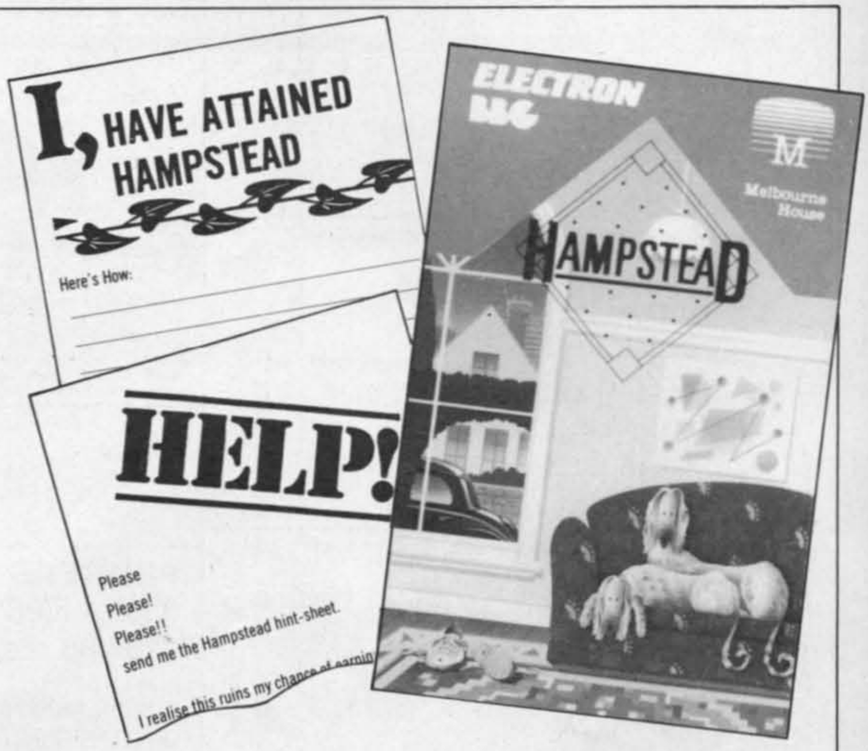
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Here's How:
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Please
Please!
Please!!
send me the Hampstead hint-sheet.
I realise this ruins my chance of earnin
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HAMPSTEAD

Get on yer bike and head for the land of Yuppies

ALICE explores the world of adventures

IN their desperate search for originality, adventure writers are coming up with some extremely novel settings for their epics, as we'll see in the three programs we'll look at this month.

Hampstead, from Melbourne House, is certainly different. It's "an adventure for would-be social climbers".

I never thought that being unemployed was an adventure to be sought, but it is certainly the best reason ever for starting stark naked with the classic inventory – namely nothing at all.

Thursday morning has dawned and it is time for you to sign on. A thorough search of your disgusting, smelly council flat is necessary before opening the one-way gate, getting "on yer bike" and quitting the dump forever.

Your UB40 is the essential key to your wheeler-dealer fortunes, for without it you will not get far in the Yuppy maze that awaits.

But you have to be careful to dress properly, keep the grease off your tracksuit and not waste your dole money betting on the horses or, even worse, settling for a railway ticket to settle in salubrious Richmond where, I presume, an ace bludger can even buy a house on DHSS grants.

Input is the simple *verb noun* and it is a purely text game with quite short descriptions, but almost every location you visit has a cynical bit of humour.

You are advised that, in order to quit Maggie's millions, you must obviously lie, cheat and (as usual) steal anything and everything on your way to that room at the top.

The program is in machine code, but a little bit of real cheating reveals that marrying money seems the main chauvanistic step to taking up your final residence in Hampstead.

Melbourne House, of Australia, created the classic best selling Hobbit adventure, but the insight into our beloved welfare state by these colonial drongos is even more surprising and original.

Very funny and quite cheap, but I scored 33 per cent in half an hour so I don't think it can be very difficult and I could have done without the twisty maze near the start.

Maybe it gets tougher towards the end, but my tape recorder stopped working and I can't afford another one.

I can't even afford the 50p plus sae to get the Hampstead booklet that reveals even more hints for upward mobility. Actually, so I'm told, all you get are just more clues to decipher. And, for those who do aspire, a seven line explanation of how you reached the top of the heap will earn you a diploma in social climbing.

Of course the real problem with smarming your way to social success is the great catch 22 of having to be friends with people you detest. Much simpler to just steal the money and be a social outcast on the Costa del Sol.

Actually you have no choice in The Pay Off – The New Jersey Heist (Bignose) because you owe Luigi $40,000 and his capos are waiting just around the corner to give you a godfatherly going over.

The adventure takes place in downtown New York and the mission you can't refuse is to break into a security building, open a safe and – ultimately – identify and crack open the correct safe deposit box to get the gem that will save your skin.

A lot of the "action" is based on the French film Rififi If you have seen this classic then you will have some notion of how to clog up delicate alarms, drill open safes and exactly how to use an umbrella when breaking into a room with a weight sensitive floor.

To help reviewers Bignose provide us with disc version (only £7.95 to you) plus a step-by-step complete solution.

Actually it is not that easy because I do have to try all the wrong things as

→

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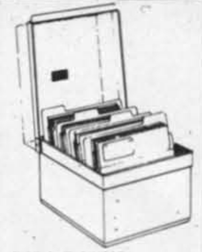

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well just to check that reasonable hints are given (they are) and that suitable disasters occur.

They do but the disc SAVE/LOAD quickly takes you back in time for another go.

Although the disc recovery is fast you only get one copy and the game has a number of red herrings and false trails. Indeed it is "the writer's hope that – the adventurer will waste a lot of time and effort" doing the wrong thing.

But adventurers *like* wasting time and effort – try bumping into a wall 100 times in Level 9's Snowball to find out what the physcobot will do to you for such "unreasonable behaviour".

Pay Off is pure, but very short, text, quite similar to and as laconic as a Scott Adams' game. The emphasis is therefore very much on manipulating the objects correctly and, I'm afraid, guessing some odd commands occasionally.

For example you have to FEEL PAINTING to make it reveal the hidden safe. It is quite fair to put the safe there, but there are a number of more appropriate synonyms which the program accepts for other activities such as GET, MOVE, LIFT and so on.

Another, only slight and personal, quibble is that the combinations of the safe and the number of the safe deposit box are both fixed, rather surprising in such a complex set of other puzzles.

This is a clever game with some play on four letter words. There is a neat sound effect when, confronted by a window, you type BREAK rather than SMASH WIND.

Having a solution makes it difficult to say how difficult it is. It's easy to map with a good story line but not for players who like lots of text, atmosphere, puns and pretty pictures.

Our final piece of software Pettigrew's Diary (Shards Software) is not so much an adventure, more a set of fairly simple puzzles in three separate programs.

The first one is an animated exploration of a cyan coloured Oxfordshire farmhouse. You start with a plan view of the ground floor in which a red haze (the fire) is spreading from a random position.

There are some vital objects to be got and these have also been placed randomly so you need time using a fire extinguisher to find out where one of them is hidden from the body lying half dead in the living room – you then leave him to burn.

To begin with I also was burnt to a crisp because you have to position your "little man" cursor quite carefully, using the arrow keys, in order to open doors, cabinets and wardrobes.

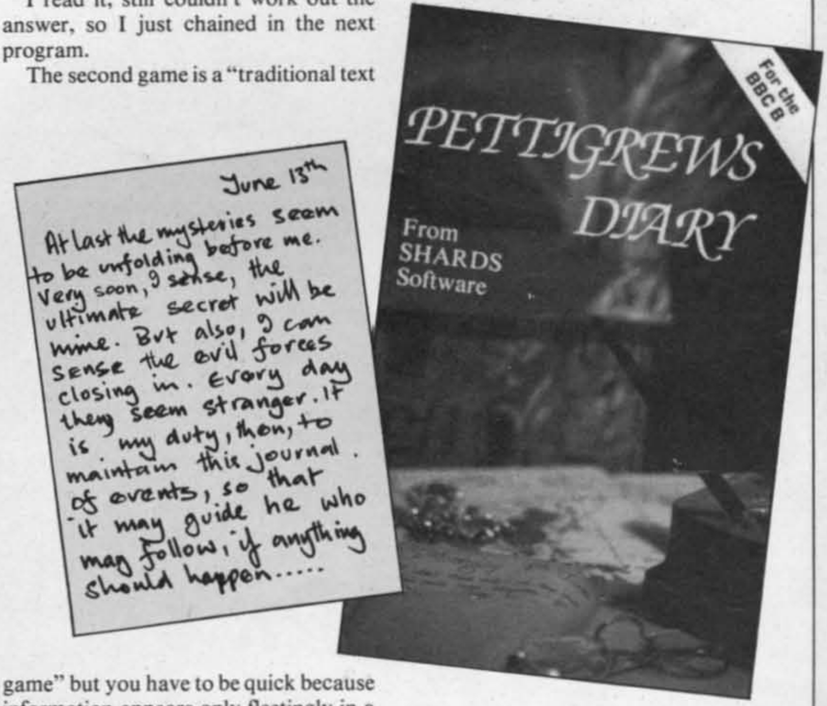
Incidentally, the fire spreads at the same speed whether doors are open or not.

The body, presumably R.J. Pettigrew, also has peculiar ideas for hiding places, including an exploding toilet.

Anyhow the most important item is old Pettigrew's diary which contains a clue to a password which activates the second part of the game.

I read it, still couldn't work out the answer, so I just chained in the next program.

The second game is a "traditional text game" but you have to be quick because information appears only fleetingly in a tiny window.


June 13th
At last the mysteries seem
to be unfolding before me.
Very soon, I sense, the
ultimate secret will be
mine. But also, I can
sense the evil forces
closing in. Every day
they seem stranger. It
is my duty, then, to
maintain this journal
of events, so that
it may guide he who
may follow, if anything
should happen.....

Basically – it is all in Basic – you have now moved to London and have to convert the contents of Pettigrew's wallet – just £100 so sufficient for a couple of rides on the Underground – into £600 plus locate two friends of the deceased, namely Annie Gram and Rhythma Tig.

If that raised a groan wait until the kind lady in the red light district takes you to her bedroom and removes ... her coat ... to reveal ...

Just call her Sally Ann and have a good night's rest.

There seem to be at least two ways you can obtain the money. One is just luck and the other is hard graft in the public toilets, but you can only get that job with the correct O levels and years of experience.

After Hampstead I just cheated again and chained in the third and last part.

Here you are presented with eight puzzles or tests of keyboard dexterity. I couldn't do the first one because you have to quickly type in a given message when "You hear the sound". Reason was I had long ago turned off the sound with *FX210,1.

There are a couple of logic puzzles, one of them based on the famous Bertrand Russell paradox of who cuts a barber's hair.

Since amateurs frequently cut their own throats and I often cut my own hair I have never really understood the problem, but people do often tell me my appearance is a mess.

The other logic puzzle is based on the paradox of the card that has printed on one side "The statement on the other side is true" and on the other side "The statement on the other side is false".

Since I, and computers, have no trouble in throwing meaningless statements into the waste bin (or bit bucket) I also fail to see the profundity of this puzzle.

I mean if someone says that he always tells lies surely you just clear

→

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your input buffer and say "Pardon?".

In conclusion the graphics, plus general layout, are poor and the interaction very clumsy. It IS an attempt to be a bit different, but it does not work for me.

However, if you don't cheat, this game is a real challenge – unusual isn't the word.

If you cannot play fair then LIST it (the protection is feeble). Actually there seems no other way of finding out how to tell it that a barber looks a mess because he cannot cut his own hair properly.

Combination of events

NO prize this month because I'm going to tell you how to solve the puzzle *(If they believe that they'll believe anything. Ed.)*.

You are short of money so decide to break into where there is plenty – the editor's office – and open his Pellian safe. The only clue to the combination is a scrap of paper on which is written:

13*I%*I%+1=P%*P%

Having worked out the two integers, I% and P%, that satisfy this equation you dial the product P%*P% and the safe opens to reveal another piece of paper on which is written the number of the editor's deposit box in Zurich thus:

61*I%*I%+1=P%*P%

To make it self-contained and easy to solve I have rewritten this puzzle in Listing I and, as usual, all you have to do is answer the questions and the program will be "overwhelmed" by your brilliance and stop.

If you don't know how to solve Pellian equations just replace lines 100 and 110 with:

100 P=P+1

and the computer will do ALL the work by simply guessing ALL possible positive integers.

This is essentially what hackers do when cracking passwords.

Actually it could take quite a while – until next April I guess – so the real puzzle is to speed up such a crude

```
   10 ON ERROR GOTO 100
   20 S=13:P=1
   30 P$="SDP/Liberals"
   40 L$="David"
   50 M$="Cyril"
   60 PRINT"The ";P$;" stood in ";S;"
 equal":PRINT"squares."
   70 PRINT"When ";L$;" joined them t
hey became one":PRINT"mighty square,"
   80 PRINT"shouting the battle cries
 of"
   90 PRINT"Out! Godemite and - Nice
one ";M$
  100 PRINT "How many ";P$;" were the
re ";
  110 INPUT"",P
  120 IF P<2 THEN 100
  130 IF SQR(P) <> INT(SQR(P)) THEN 1
00
  140 C=SQR((P-1)/S)
  150 IF C<> INT(C) THEN 100
  160 PRINT P;" IS RIGHT"
  170 IF S=29 THEN PRINT"I'm overwhel
med":END
  180 S=29
  190 P$="Tories"
  200 L$="Maggie"
  210 M$="Norman"
  220 GOTO 60
```

Listing I

Letters Corner

THE table in Figure I and the following hint gave my own private Spell program a hard time.

"Dear Alice.

Haven't read the message at the bottom of the well in Adventure Quest? Dear me, what's wrong with you? I thought you always knew what to do when stuck – YOU CHEAT! – though I must admit I only discovered this one by accident.

If you reload a part of the game but press Escape half way through then you goto that part of the game but keep all your current possessions.

After telling you this it should be obvious that you DON'T need the lamp to see the message.

All you have to do is go to the bottom of the well (glug, glug) save this position, go to the lake and get the jellyfish, and then restore the well position of the game but press Escape when the first page has loaded.

Happy hacking, David Stedman, Newport, Gwent".

Actually I have cracked a couple of other programs with this "half load" trick and feel like jumping down a well for not using it as above.

Any other (universal) hacks, cheats and dirty tricks from readers will be passed on in the interests of saving time and sanity.

Answering the prisoners'

HERE'S the solution to the Turpitudinous Twentyone from the April 1985 *Micro User:* How to manacle 21 prisoners in groups of three for the maximum number of days.

Henry Dudeney solved it over a century ago, but computers are very poor at this sort of calculation. You really have to understand the problem before writing an exhaustive search program.

Dudeney's solution is given in Figure I. Note that it is possible to manacle the prisoners for 15 days, by which time every one of them has been chained directly to every other prisoner. I have not given the final

poser

day because you can work it out by elimination.

No one knows how many different solutions there are to this problem, but next month I will describe how to generate all the solutions for the much simpler Filthy Fifteen problem that appeared in the September 1984 issue.

search for the right "combinations".

The crucial tests in the program are in lines 120-150 and a bit of analysis should reveal how to guess far more effectively.

Note also that by simply changing line 20 to:

```
20 S=RND(1000)
```

the program will effectively ask for 1000 different combinations without knowing any actual answers.

In fact the first 100 were worked out long before computers appeared and can be found in A. Beiler's "Recreations in the Theory of Numbers".

A final fact is that 1620*4*4+1 = 161*161 = 25921, so S=1620 is quickly solved.

MANACLE 21 PRISONERS X-Y-Z

DAY							
1	ABC	DEF	GHI	JKL	MNO	PQR	STU
2	ACQ	DBF	ESN	HUM	ITJ	KGR	LPO
3	ADS	BQN	ECJ	FKT	GPH	IRM	LOU
4	AFR	BEK	GMJ	HTO	ICU	NLS	PDQ
5	AGD	BNI	CRO	ETQ	HFM	JSK	LUP
6	AIQ	BGN	CDU	ELJ	FPT	MKO	RHS
7	AJB	CLG	DRT	FIO	HKQ	MSP	NEU
8	AKU	BSI	CGF	DLT	EJQ	HOM	PNR
9	AOQ	CFL	DIU	EHN	JPM	KBR	SGT
10	ATC	BPK	ERJ	FQG	HDO	IML	NUS
11	EAL	BOG	CND	FJI	HMT	KRP	SQU
12	HAQ	DFT	GEI	KCP	LBM	NJU	OSR
13	MAN	DJG	EQL	FUR	HBT	KIP	OCS
14	PAS	BUG	CHQ	DME	FOJ	ILR	KNT
15	???	???	???	???	???	???	???

Figure I

Tired of being Harmless?
Sick of being Competent?
Dying to be Deadly?
Desperate to be Dangerous?

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Proceeding systematically...

A PROCEDURE library system is a way of storing individual procedures from a program. It should give comprehensive information about procedures it holds in store, and allow them to be appended to a program under development.

To a certain extent, this can be done from the BBC keyboard – delete a program except for the relevant procedure, renumber as required, *SPOOL it on to disc and *EXEC it later when needed.

However, it's a time-consuming operation if there are many saveable procedures in a program. Ideally, a procedure library system should do all this quickly and simply.

Clares **PROfile** package claims to be able to do this.

It's a disc-based system which auto-boots to a menu from which you can set up a library file for all your procedures.

They are isolated from programs and saved independently, and can subsequently be merged with a resident program.

Sounds ideal? In practice, the whole system has a rather awkward feel to it.

You are warned not to load large programs greater than 14k for further development as they may crash the machine – and they do.

Anyway, I loaded a program after setting up the data file and saved all the procedures to a blank disc. When I tried to merge them with another program I kept getting the message "Not a Basic program", but on exit it listed perfectly – excluding the attempted merges.

Another facility it claims to offer when saving a particular procedure is to give you an option to save any procedures called within that procedure.

This is handled competently, although trying it with an old data file there were problems which disappeared when I reformatted the data disc.

More serious are the occasional crashes when you are merging procedures. I even found problems with a program only 8k long. On the whole, Clares' PROfile does what it claims to be capable of, but I think that the partsave facility of some toolkit ROMs is equally useful, less fiddly and alleviates the need for the disc-swapping which PROfile revels in.

Additionally, I have found that my procedures are never portable between programs – anything low-level enough is usually on a par with standard Basic functions.

For those of you who differ, perhaps requiring a system for storing sound envelopes or assembler macros, then this package may well be for you.

Tim Craig

Sprites on the rampage

IF you can imagine Defender twisted on its side with the mentality of Rambo in a bad mood then you are getting close to the destruction possible in **Video Revenge** from Budgie Software. (No, it's not going cheap!)

Officially you must pilot the Federation fighter Power Blaster against the usual invading waves of intergalactic aliens.

Though the space is literally crawling with them, you've got several surprises in your armoury that'll wipe them out.

The screen shows the area of space you're in and you can move up, down, left or right with the help of a Defender-style long range scanner at one side of the screen.

If things really hot up you can fall back on a smart bomb to instantly destroy everything on the screen – except you, of course.

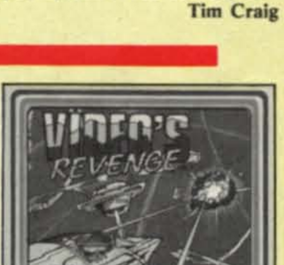
Another feature is invisoflight which makes you temporarily invisible and hence indestructible.

That extra Rambo element is achieved by power blasting which multiplies your firepower threefold. You do this by shooting the alien energy balloon 12 times and then catching the energy pack it ejects. In practice the energy balloon isn't as keen on this as you are, so it tends to shoot back.

The sprites are fast, furious and plentiful but they do tend to flicker a bit. Sound is wonderful.

The general presentation is excellent with title pages and high score charts that slide on and off the screen.

The instructions are adequate though after reading them I was expecting something a little more run of the mill. The Return key comes in for the usual hammering since the keys cannot be redefined and joysticks aren't catered for.



Phil Tudor

Package with exciting potential

IT is always a pleasure to work through and write about quality productions.

Here there are four programs from the BBC – **Summit, Nomad, Flight** and **River** – designed for the 10 to 12 year-old range and linked to the BBC Schools Radio series **Introducing Geography.**

However, each of the set may be used quite independently and usefully integrated into a separate curriculum niche.

The standard of programming is excellent and some of the graphics outstanding.

The representation of Mt. Everest in Summit and the world map in Flight are well worth seeing and set a standard that some educational software producers would do well to follow.

These programs are on three 5¼in discs with a 40-track format.

Included with the discs is a converter program for 80-track drives.

The package comes complete with a manual containing a description of each program, user instructions, help with recording information and notes for parents and teachers.

Summit is very useful as a logistics exercise and has much to offer. It is based on an attempt to climb Mt. Everest and simulates the organisational and environmental hazards faced by climbers with a "30-day" time limit.

They must conquer the peak between the end of the monsoon rains and the winter snows.

The leaders have to organise the climbing route and, using teams of sherpas move the basic

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From Page 79

supplies of tents, food, rope and oxygen from the base camp to the higher camps.

In contrast to this, **River** aims to encourage an appreciation of river landscapes and is based on contour interpretation.

The route followed by a river must be traced out on a map using four basic directions. There are three levels of difficulty which include questions that must be answered using basic river terminology.

An excellent part of this program is the explanation of cross-sections.

Nomad attempts to simulate the nomadic life of the Fulani in the sub-Saharan zone of West Africa.

It includes seasonal climatic changes, their effects on vegetation, and the inter-relationships of climate, vegetation, animal and human life.

My basic criticism of this program is the time it takes to complete, especially given the pressures on computer use in schools.

However it does have a number of potential uses and should be given careful consideration.

The fourth program, **Flight,** simulates four air journeys from London to Adelaide, Johannesburg, Buenos Aires and Los Angeles respectively.

It encourages the use of atlases and is the type of program that encourages much discussion and decision-making.

Questions related to the journey are asked during the flight and so very detailed route preparation is essential.

Each group using the program has a separate call sign and this allows for more efficient classroom use.

A broad review of this type can only include an outline of each program. I suggest you view them if you can and assess whether you think each fits the way you see the subject being taught.

Certainly, my verdict is that each of these would be good value on its own. The whole package, therefore, represents an excellent buy with exciting potential.

Norman Parr

Maze..and munching butties

BLUE Ribbon Software have released some of the top-selling MRM titles under their own label, retailing at the low price of £2.50.

In addition they have produced two disc packs, each containing five of these games priced at just under £10.

The first on offer in Pack 1 is **Q-Man.** In this excellent adaptation of Q-Bert, the idea is to hop on to all the squares of a pyramid, changing their colour.

Your task is hindered by nasties in the form of bouncing balls and Jake the Snake.

To escape their attention, you can use a magic disc which will teleport you back to the top.

Next in the package is the **3D Nightmare Maze.** You are Sleepy Joe and in order to escape must collect keys scattered over the maze.

The only problem is you have but 60 seconds to accomplish this and leave via the door avoiding a variety of meanies.

On the first screen, for example, they are giant "springy things" bouncing along the paths.

On later sheets these become Bouncing Balls, Deadly Frogs and Hungry Hoppers.

A cup of coffee randomly appears and drinking this will wake you up and remove the nasties for a short while.

3D Munchy is the third offering and is basically a Pacman game in 3D. Here you have to avoid monsters that dig holes to prevent your passing.

You race around eating pills and scoring points until you either run out of pills or time.

Naturally there are power pills at four ends of the maze and eating any of these results in the four monsters changing colour and running away.

This is when you can get your own back and eat them.

Next in the package is **Castle Assault,** which is quite an original game.

You must reach the top of a guarded tower and collect a gold bag. On your ascent you can collect various fruits for extra bonus points.

The meanies out to stop you include crabs, snakes, lobsters, spiders, bugs and beetles. These dwell in holes on the tower and they jump up and down in an attempt to knock you off.

Last but not least in the package is **Banana Man.** You must eat 40 banana butties in a minute in order to survive to the next screen.

You receive extra points for attacking purple cats which turn into spiders after being attacked.

Stand on a spider or run out of time and you lose one of your lives.

Blocks appear at random and may bar your way to banana butties. To get around these you can shuffle the blocks about but only for four seconds.

These are all established games already, and together make a package that is extremely good fun and value for money.

Andy Mack

English can be easier

THE Lively Sentence, from Summer 76, is the first in the series English is Easy. The packaging declares that the software is intended to ease the English language teacher's load by "tackling a long-neglected area".

The program uses text and teletext graphics to demonstrate the fundamentals of sentence structure and literary style.

It commences with the identification of sentences, concrete and abstract subjects and verbs, phrases and metaphors, and the use of past, present and future tenses.

There is a very useful section on making abstract sentences lively and interesting by the use of metaphoric verbs and subjects to give the impression of strong movement and solidity.

It also shows how to achieve a greater impact by reducing the gap between subject and verb.

The program stresses the importance of using words that are easily understood, but also suits the situation. For instance, Classical words for precision, accuracy and subtlety, and Old English words for creating certain moods to appeal to the senses.

The program concludes with a clear and useful summing-up of the main points covered, followed by a record of the student's performance.

Overall, the program has many positive qualities.

The text is informative, lively and easy to follow.

The Mode 7 graphics are excellent. The well-designed, amusing illustrations certainly enhance the program's general appeal.

A large animated rocket is cleverly used as a demonstration of a sentence's effect. A greater impact causes a more powerful lift-off.

Accompanying documentation is minimal, consisting only of technical notes on getting started, loading and general program operation.

If lacks the clear outlines of the program's aims and objectives and detailed software description vital for educational users.

The program's main weakness is that it fails to consolidate the skills being demonstrated.

The easiest solution would be a pack of accompanying work sheets for duplication, so that students could have immediate access to appropriate practical follow-up work away from the computer.

This would make it a much more attractive proposition for the busy teacher!

Nevertheless, it is a useful source of information on important literary techniques, in an area where software is sadly lacking.

Jim McHugh

Bouncing Boffin

BOFFIN
BBC 'B' & ELECTRON
Addictive
£9.95

FOLLOWING the success of Football Manager, Addictive Games have moved from strategy to arcade action with **Boffin.**

Professor Boffin must travel through a complex of 20 caves, the route being constructed from small ledges. The professor can leap between some of them but others must be negotiated by alternative methods.

Each cave is littered with numerous unlucky horse shoes. The professor has to collect them all before touching the lucky owl. If he happens to have forgotten any, touching the owl isn't so lucky.

Movement consists of left, right and jump. The professor carries an umbrella which proves very useful when falling from great heights and can also be used to reach high objects.

Although some ledges cannot be reached by jumping, fortunately the previous inhabitants of the caves were trampolining enthusiasts and left their equipment behind.

Though the real difficulty lies in the layout of the screen, a game of this kind would not be the same without the bad guys.

The hazardous character present in this case is an enormous tarantula.

Another quite daunting creature is the manta-bat. Thankfully these prove friendly and can be used as living escalators when you can't find a trampoline.

The ladders and levels section of the arcade market is very crowded but I feel that Professor Boffin has sufficient originality to succeed against all the competition. **Carol Barrow**

Classy CAL on chemicals

CHEMICAL Collisions, from Cambridge Micro Software, manages to combine all the qualities you expect from a first-class CAL package (including the price – only £15.95).

The program, which comes on an 80-track disc, is aimed at 15 to 16 year-olds studying basic chemical changes, and at 17 to 18 year-olds working on the mathematics of reaction kinetics.

It shows the effects, at the molecular level, of combining two gases.

Each set of randomly-moving particles has its own colour, and if two particles of different colours collide with sufficient energy, a new white particle is formed. Simple in concept, the program does much more than this.

It not only takes into account elapsed time, temperature and initial molecular concentrations (all under user-control), but also continuously updates the data it is accessing, so that the chance of an effective collision is determined by an interaction of all three factors.

In addition, the element of randomness gives slightly differing results with each reaction.

The result is that the program can be run several times using the same initial parameters, and the mean result calculated, just as in real experiments.

Numerical counts of all collisions, effective collisions only, and particle populations can be displayed at any time during a reaction, and plotted as graphs or bar charts to show how the relative particle concentrations have changed with time.

A reaction can be stopped at any point so that data can be analysed in detail.

User-definable controls allow colours of particles to be changed (essential with a monochrome monitor), function keys to be used for storing sets of commands, and adjustments to be made to the monitor setting.

The quality of the graphics and speed of animation are well above average and the documentation is also very well done, with excellent teaching suggestions.

Chemical Collisions has been designed throughout with the user in mind, and in operation it provides a flexible and very convincing simulation of chemical reactions and diffusions which no book or even video can hope to compete with.

Katherine Cranford

Micro in charge of the class

WITH their first sortie into the jungle of music teaching programs, Mupados Software are aiming to reach a large but comparatively uncharted area of the market. The huge number of primary school children learning the recorder.

Recorder Tutor is not only one of the few packages specific to the instrument, but is also designed expressly for large group work.

With it, a primary school teacher can more or less leave the BBC Micro to its own devices and be in among the pupils.

Each of the 26 lessons introduces notes by showing their finger positions for the descant or tenor recorder, with the instrument sensibly drawn on the screen as you see it when playing – that is, upside down.

The lessons are accompanied by exercises and melodies, represented in standard notation, which can be sounded at different tempi.

When the tune, and hopefully the pupil, reach the bottom of the screen, the top line moves on to the next "page", an effective way of simulating a printed score and far more natural to read than scrolling.

There are facilities for adjusting volume to suit the size of a class, for repeating given bars and for sounding rhythms. There is a metronome, a bouncing ball and a beat counter.

In fact, every appropriate teaching aid has been provided, except one – an authoring facility.

You're stuck with a rock/pop style made educationally respectable with snippets from the classics. Not every teacher's taste, nor every pupil's, for that matter.

On the other hand the package includes an audio tape containing all the tunes played nicely, with full band backing, then repeated in accompaniment-only versions for pupils to supply the melody.

The scores are also reproduced in the manual, which though too self-congratulatory, is thorough and well laid out.

Duet and ensemble parts are available separately.

Few resourceful teachers should fail to see the advantages of such a program.

Indeed, the only real obstacle to its being a successful pioneer is its price: £27 for the disc version and £25 for the cassette. Hardly a good start.

Gabriel Jacobs

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Marching towards a true wargame

IN **Battlefields**, a two-in-one deal of two player games, BBC Soft is offering a game of strategy, the American Civil War, and a game of tactics, Waterloo.

In case you're puzzled as to the difference between strategy and tactics, strategy is the manipulation of armies, people, politicians and resources to make history go the way you want.

Tactics are how you manoeuvre elements of armies to achieve victory in battles.

Put more simply, strategy is how you win wars, tactics are how you win battles.

American Civil War presents you with a map of the south and east states of America which were involved in the conflict.

The object is to capture a proportion of your opponent's territory and wipe out his forces.

Each side starts at pre-set locations with three fleets and seven armies, details of which are given for both players at the start.

Each turn is equivalent to one year of the war, divided into eight movement phases representing about one month's campaigning.

Players input all eight moves for each turn in secret and the computer then does the rest.

Playing the game, though, is not all that straightforward. If you try to move into difficult terrain you may not be allowed to move in during that phase.

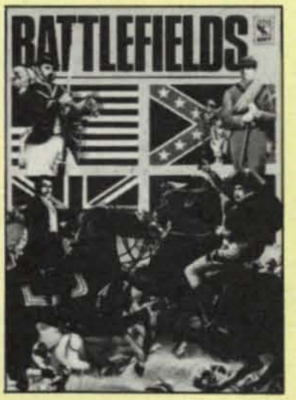
Cities, even if not defended by an army or fleet, may resist your attempts to move in them and you may meet the enemy, in which case the resulting battle is resolved by the computer.

You quickly become used to the movement system but planning your moves to cope with what your opponent may do is definitely more challenging.

This is an excellent little strategy game and a good introduction to this type of computer wargaming.

The second part of the package, Waterloo, is a representation of the famous last battle of Napoleon which brought the First Empire to an end.

It covers the area around



Waterloo and may last for the equivalent of several days. Each turn represents an hour of time.

The armies consist of units commanded by a named general, with most units made up of a mixture of artillery, cavalry and infantry.

Initially the Allies are to the north and east and the French to the south. Each side inputs its movement orders, which are carried out by the computer.

First though – and this is the most interesting part – it reports whether any of your units have sighted or contacted the enemy.

Based on this you plan your next move, but you have to remember that the reports relate to where the enemy was, not where they are now.

When you do clash with the enemy the computer will decide whether it is just a skirmish, and calculates the casualties accordingly.

Alternatively it gives you a close up of the battle area and the battle takes place in 10 minute segments.

I find the last an excellent idea, but wish that more detail could have been incorporated.

My only major criticism relates to the square grid used for movement. The problem with a square pattern is that a diagonal move of one square is further than a vertical or horizontal move of one square.

Many years ago board wargame designers abandoned the square grid and went for the hexagon as a fair method of distance and movement measurement.

As with American Civil War, you quickly get used to the movement system, but finding and dealing with the enemy is another problem.

Both games have good, clear graphics bearing in mind the scale they are working at, and will keep players busy for a few hours.

I do not believe that there is yet a true wargame available for the BBC Micro of a standard acceptable to serious wargamers, but Battlefields is certainly leading the way.

Roberta Wood

Confuzion is good for you

ORIGINALITY is a rare commodity in the software business, but **Confuzion** from Incentive Software is new, original, and should put that spark back into your computer.

The action takes place in a 64 storey industrial plant which is involved in the production of deadly confuzion bombs.

Each floor is constructed from a series of sliding panels plus one empty section – just like the sliding block puzzles that children play with.

Each panel contains lengths of fuze wire of differing shapes and wandering around the wire is a brightly glowing spark.

Your task is to guide the spark to a bomb by sliding the panels in such a way that they create one continuous length of fuze leading to the bomb.

As if this were not taxing enough, the whole thing is a race against time.

A length of fuze, which runs across the top of the screen, slowly burns away. Should you fail to explode every bomb before the fuze burns away then it's tough luck.

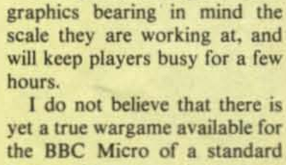
All of the bombs re-appear and you must tackle the screen again ... and again, until you get it right.

As your ability increases you will have to negotiate larger grids. These contain multiple bombs plus water droplets from the sprinkler system. These droplets also move around the fuze wire. Once you have reached a screen which contains three of more droplets you find that you spend more time avoiding them than detonating bombs.

It is essential that you steer the spark well clear of the water droplets as any collision will soon dampen your enfuzeiasm.

The player is given the option to start at one of several levels. This enables even the poorest of players to tackle some of the really nasty screens.

I found Confuzion very refreshing. It taxes mental and physical agility – quite a change from the usual mindless keyboard bashing. The whole thing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The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage, which if sent before 8pm is delivered by first post the following day (except Sunday). Originally designed for people to phone their message via the operator, the service costs £3.50 for 50 words. Now it's available via MicroLink – and costs only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are ... home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.
Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays: Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.
Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.
Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).
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Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).
Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.
If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.
These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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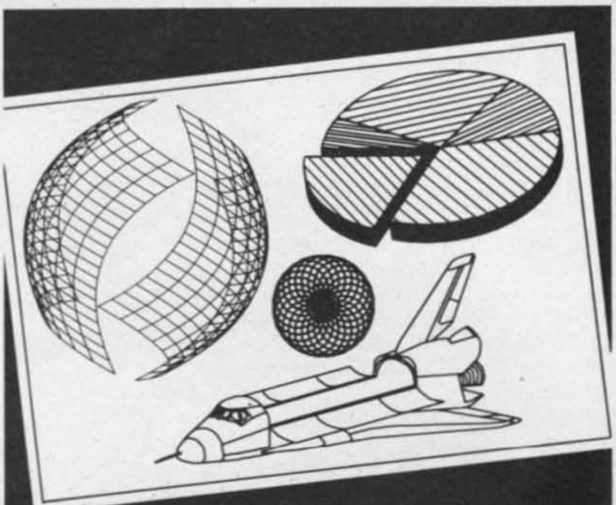

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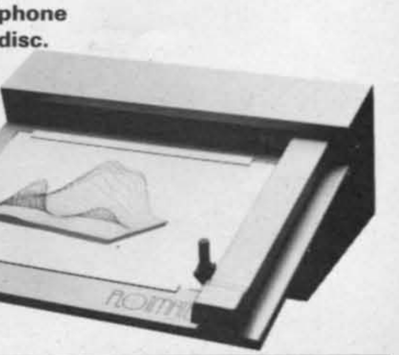

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Beating bugs – or how to avoid that $16m hyphen

MICHAEL STALLYBRASS concludes his basic analyser program

HAVING described the main syntax checking program, I'll now turn to the program that produces the finished cross-reference tables.

As with the program given last month, I have listed the main variables used in Table I, and Tables II and III give details of the use of the arrays *use%* and *vartype%*.

However for the meaning of the context codes, and the line reference use codes, please refer to Tables III and IV of last month's article. The program splits into several logical sections, as outlined below, with a few common routines and data for headings at the end (lines 4130-4350).

After the syntax check has been performed by Part1, the program we listed last month, the first operation is to reverse the order of all the chains of references, so that the last occurrence of each reference appears at the end of its list and not at the start – the position at which they are added by Part1, for reasons of speed.

This is done by PROCreverse (line 3260), called while the variable-type usages are being found by PROCcount (lines 3200-3240). PROCcount sets the count of catalogue entry types – system variables, integers, and so on – in the array *vartype%( ),* and the catalogue useage in the array *use%( ).*

Once this is done a menu of options is presented. You can obtain a summary of the analysed program's vital statistics, a list of all the variable, FN and PROC names used classified by type, a comprehensive alphabetically sorted cross reference list of names used, a comprehensive line number reference listing, or all the above four as one report.

If you have a printer you also have the option of printing a copy of the report, using any line length between 40 and 254 characters.

A summary of the program's vital statistics is given by PROCsummary (lines 3280-3420) which in turn calls PROCuse (lines 3440-3470). Both PROCs are fairly simple to follow, PROCuse being used to print out the usage of the different elements of the variable catalogue (as set by PROC-count).

The list of names used, sorted by the

Name	Use
A%	Working variable when reversing references chain.
F%	Pointer to free storage (passed from Part1).
G%	Constant (&FFFF).
H%	Constant (&FFFF0000).
I%	Working variable.
J%	Working variable.
K%	Constant (&10000).
M%	Pointer to top of workspace (passed from Part1).
N%	Current line number.
O%	Working variable in current line number reference.
Q%	Pointer to start of catalogue area (passed from Part1).
R%	Pointer to start of variable workspace (passed from Part1).
S%	Current reference to be printed.
T%	Type of current entry.
U%	Context of current reference.
V%	Number of primary entries (passed from Part1).
W%	Number of secondary references (passed from Part1).
X%, Y%, Z%	Working variables.
a%, b%	Catalogue entry and column in catalogue use summary.
c%	Count of refs for current entry.
p%	Printer active flag.
r%	Reference detail required flag.
tst%	Current line reference type.
u%	Working variable in determining context code to be printed.
w%	Printer width
x%	Set/Use references required flag.
use%	Array of counts of catalogue entries.
vartype%	Array of counts of entry types.
a$, b$, t$	Various working variables.
h$	Heading to be printed out.
n$	Current entry name.

Table I: Main variables

type of entry, is printed out by PROCnames (lines 3490-3570).

The PROC works through all the possible types of entry, from *J%=0* for system variables to *J%=9* for PROC names, going alphabetically through the catalogue entries for all the ordinary variable entries. PROCentries is called to print out the appropriate names.

The full name cross-reference and context table is produced by PROCnrefs (lines 3590-3680). First a key to the codes used is given by PROCrkey (lines 3700-3760) which spaces out the key according to the width available on screen or printer.

Then, as appropriate, PROCentries is again called, but this time to give the full list of references as well as the relevant name for each entry. This is done by PROCrefs (lines 3830-3860) which gives the "set" and then the "used" references, checking that there is no apparent error in setting or useage, by calls to FNrefs, which in turn calls FNctx to give the context codes (lines 3880-3990).

Listing the line references is carried out by PROClrefs and PROClentry (lines 4010-4110). PROClrefs goes through each of the possible types of entry – GOTO, GOSUB and so on – and calls PROClentry if there are entries of the appropriate type. PROClentry then prints out all the references of that type, giving decimal line numbers or hexadecimal addresses for CALL and USR references.

All programs of any size will contain errors when they are first written. Debugging is the process of correcting errors as they are found. It can often take over half the total development time of a program, and it can prove very expensive if it is not done properly. In 1962 the Americans wrote off $16.5 million simply because a program on board a rocket was missing a single hyphen!

Obviously the bugs in a program cannot be corrected till they are found, and it may take some years of use of the program before some bugs surface in an obscure part of a program.

However the Basic Analyser program can help you to find many of those lurking bugs quickly before you have even started to run the faulty program.

Bugs can exist in a number of guises. First there are the syntax errors. These are frequently caused by typing errors. But whatever the cause, they are identified by the Analyser Part1.

Index	Meaning
0	System variable.
1	Resident integer.
2	Integer.
3	Integer array.
4	Real.
5	Real array.
6	String.
7	String array.
8	FN name.
9	PROC name.
10	Line numbers.

Table II: Types as used with vartype%

If a syntax error is detected the offending line is printed out, along with a message giving the error, the line number, the statement and the character within the line where the error was detected.

An arrow is also printed under the offending character. Note, however, that the line may look a trifle odd, because Basic tokens are not expanded, but are simply shown as a single square.

Of a more serious nature are the logic errors in a program. These, too, may have been introduced by mistyping, but because the rules of syntax are not broken, the error may not become apparent till the program runs and it stops with an error message.

For example, a variable name may have been misspelt, but this might not become apparent until a "no such variable" error message appears when the program is RUN. However the cross-reference listing can be used to good advantage here.

Always check that every variable found is both set and used, otherwise there is probably something wrong. Check also that all FNs and PROCs are defined and used (but only defined once) and that any parameter lists match up correctly.

Index	Meaning
0	System variables.
1	Resident integers.
2	Variables A.
27	Variables Z.
28	Variables £.
29	Variables _.
30	Variables a.
55	Variables z.
56	FN names.
57	PROC names.
58	Line numbers.

Table III: Entries given by use%

Logic errors can arise in other ways too. A block of lines may have been omitted during the initial typing, so check the summary which gives the total of lines found against the number of lines you thought there should have been.

Alternatively, you may have forgotten to match a FOR or a REPEAT with a NEXT or an UNTIL. These can often be found by listing the program having first set LISTO7 (see page 290 of the BBC User Guide for a full explanation of LISTO), as unbalanced loops will show up in the way the listing is indented.

But note that NEXTs which end more than one loop, by having a following list of variables or commas, or multiple exit points from a REPEAT or FOR loop with only one entry point or vice versa will also unbalance the indentation of the listing.

Note especially that cancellation of the indentation too many times will not show up – only too few cancellations will.

Having done all this, there may still be bugs, but these can only be found by test running the program. Some bugs will be found by the interpreter because of arithmetic problems, say causing a "–ve root" error, or errors in the program structure – causing a "no FOR" error.

Other bugs can only be found by checking the results of the program. If it is possible to test out small parts of the program in isolation do so – the smaller the chunk of program that you are debugging the quicker you will do it.

A well structured program helps considerably at this point. If the program is sitting in memory, individual FNs or PROCs can be tested simply by setting any necessary variables, typing in PRINT FNa or PROCb, and then checking the value of any relevant variables at the end.

Try to test the boundary conditions in particular: say, if you expect *X%* to lie between 0 and 10 only, check what happens for *X%=0* and *X%=10*

It is also worth while making sure that erroneous inputs are coped with sensibly, and not just correct ones –

→

From Page 89

using the previous example test the effect of *X%=-1* and *X%=11*. If this reveals that a part of the program is wrongly setting a variable, the cross-reference listing can be used to pinpoint where the variable is being set and used, and hence where the error is likely to be.

Missing ends to program sections will not always produce an obvious error when the program runs. However No PROC, No FN, or No GOSUB errors almost always point to a missing END at the end of the main section of a program, or a missing ENDPROC, RETURN or function return (=value) in the lines before the reported error line.

If you still have problems when the program is run try putting in some extra statements to pause and perhaps to print out some variables at key points, say add in a line such as 721 PRINT "Line 721",X%,GET. It may also help to use the TRACE ON statement – see page 367 of the BBC User Guide – to follow progress through the program line by line.

Note however, that TRACE will not give a complete picture, as the line number is only printed every time a new line is started.

Loops within a line, and the starting line of FNs and PROCs, will not be indicated by the TRACEd line numbers. The PROC and FN, and also the GOTO and GOSUB cross-references, can also prove very useful in finding the possible routes to a particular point in the program.

It sometimes happens that your problems are caused by a bug in the Basic interpreter itself. For example, INSTR(a$,b$ . . .) causes problems in Basic I if *a$* is longer than *b$*. The use of a unary minus can also cause some problems.

Another quirk is the use of TAB(x,y) – but not the use of TAB(x) – which leaves the Basic interpreter's counter for the position in a line of output incorrectly set until a new line is begun.

With any luck by this stage the program is working correctly. If you are still having problems you may have the worst kind of bug of all – the misunderstanding.

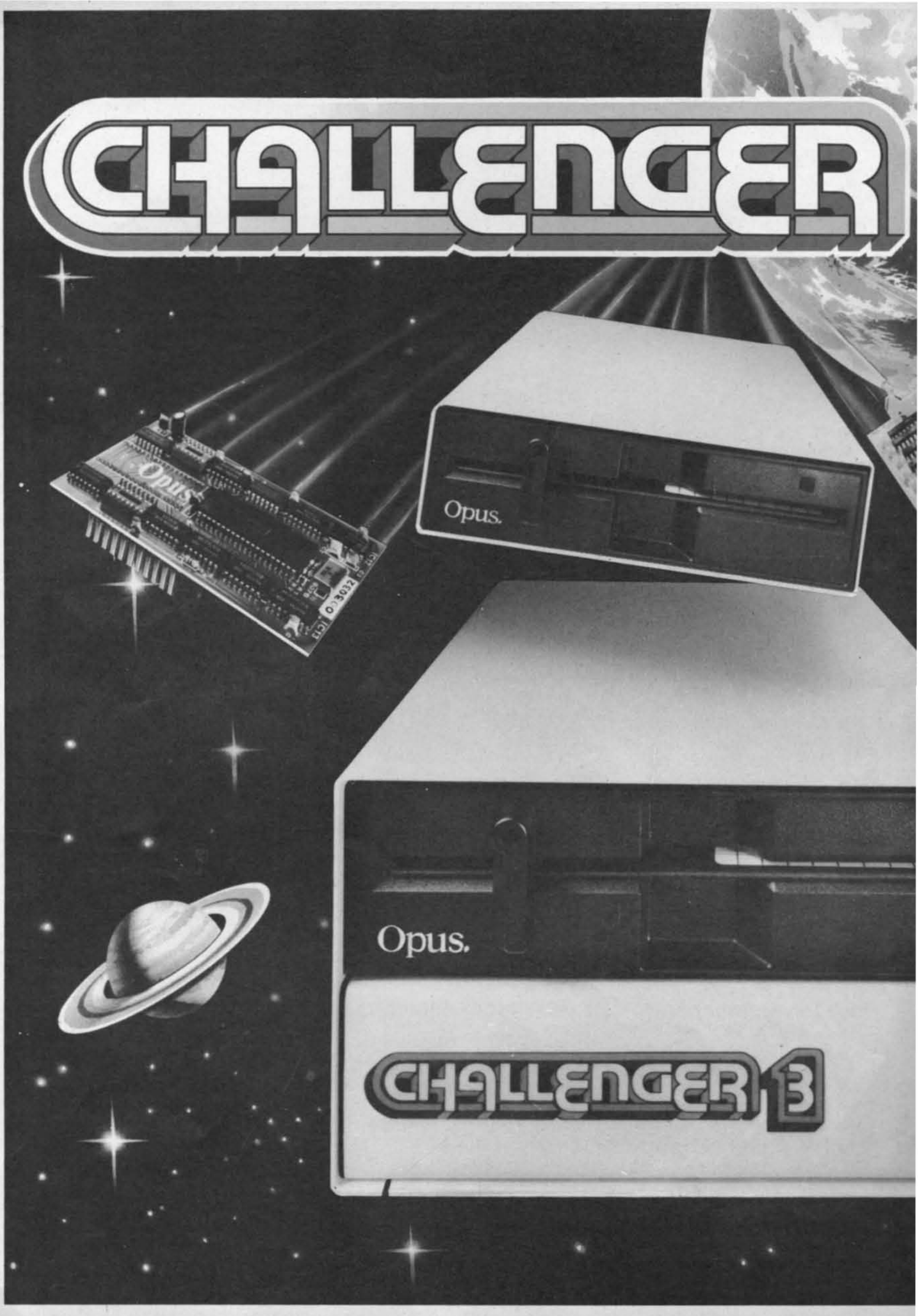
This happens when the program works quite happily but just does not do what you originally thought that you intended.

Often the only cure for this is to start again, solving the correct problem the second time around – or so you hope – and you become wiser from the experience. Or so I'm told . . .

```
 2900 REM ***************************
 2910 REM ***************************
 2920 :
 2930 :
 2940 REM BASIC ANALYSER (Part2)
 2950 :
 2960 REM (c) The Micro User
 2970 REM
 2980 REM
 2990 :
 3000 REM ***************************
 3010 CLEAR : PROCinit
 3020 REPEAT : CLS : FOR I%=1 TO 2 :
PRINT CHR$129 CHR$157 CHR$141 CHR$135
 TAB(10) "B A S I C  Analyser" : NEX
T
 3030 PRINT TAB(0,3) : RESTORE 4240 :
 FOR I%=0 TO 7 : READ a$, b$ : PRINT
TAB(1) a$ TAB(32) b$ : NEXT
 3040 PRINT ''CHR$131 "Enter choice"
TAB(27) " ==> "; : a$=CHR$(GET AND 95
)
 3050 IF a$="E" : CLS : END : ELSE PR
INT a$
 3060 PRINT 'CHR$131 "Print results?
(Y/N) "; : p%=(GET AND 95)=89 : PRINT
 'CHR$131; : IF NOTp% : w%=40 : VDU 3
,14,12 : ELSE INPUT "Printer width? "
 w% : VDU 2,15 : IF w%<40 : w%=40
 3070 IF a$="S" : PROCsummary
 3080 IF a$="N" : PROCnames
 3090 IF a$="R" : PROCnrefs
 3100 IF a$="L" : PROClrefs
 3110 IF a$="A" : PROCsummary : PROCn
ames : PROCnrefs : PROClrefs
 3120 VDU 3 : UNTIL FALSE
 3130 :
 3140 DEF PROCinit
 3150 DIMuse%(58),vartype%(10) : @%=&
505 : G%=&FFFF : H%=&FFFF0000 : K%=&1
0000
 3160 FOR J%=0 TO 10 : vartype%(J%)=0
 : NEXT
 3170 FOR J%=0 TO 58 : use%(J%)=0 : X
%=Q%!(J%*4) : IF X%<>0 PROCcount
 3180 NEXT : ENDPROC
 3190 :
 3200 DEF PROCcount
 3210 REPEAT : Z%=(X%!2) AND G% : IF
Z%<>0 : PROCreverse
 3220 IF J%<2 : T%=J% : ELSE IF J%>55
 : T%=J%-48 : ELSE T%=X%?4 : IF T%>7
: T%=T%-2
 3230 use%(J%)=use%(J%)+1 : vartype%(
T%)=vartype%(T%)+1
 3240 X%=!X% AND G% : UNTIL X%=0 : EN
DPROC
 3250 :
 3260 DEF PROCreverse : A%=0 : REPEAT
 : Y%=Z% : Z%=(!Y%) AND G% : !Y%=((!Y
%) AND H%)+A% : A%=Y% : UNTIL Z%=0 :
X%!2=((X%!2) AND H%)+A% : ENDPROC
 3270 :
 3280 DEF PROCsummary
 3290 RESTORE 4250 : READ h$ : PROChe
ad("=")
 3300 PRINT TAB(2) "Program Name : "
$R% ''TAB(2) "Total length : &"; ~Q%!
252 " bytes"
 3310 PRINT 'TAB(2) "Analysed from li
ne "; Q%!236 " to " Q%!240
 3320 PRINT 'TAB(2) "Total lines anal
ysed : "; Q%!244 TAB(2) "(containing
" Q%!248 " statements)"
 3330 PRINT 'TAB(2) "Names etc found
: "; V% TAB(2) "(with " W% " referenc
es)" ''TAB(2) "Workspace used : &" ~F
%-Q% TAB(2) "(workspace free &" M%-F%
 ")"'
 3340 FOR I%=0 TO 10 : READ t$ : PRIN
T TAB(2) t$ TAB(22) vartype%(I%) : NE
XT
 3350 READ h$ : PROChead("-")
 3360 FOR I%=0 TO 1 : FOR J%=1 TO 3
 3370 PROCuse(I%+14*J%,J%)
 3380 NEXT : NEXT
 3390 FOR I%=2 TO 13 : FOR J%=0 TO 3
 3400 PROCuse(I%+14*J%,J%)
 3410 NEXT : NEXT
 3420 PRINT ' : PROCfoot : ENDPROC
 3430 :
 3440 DEF PROCuse(a%,b%)
 3450 a$=STR$(use%(a%)) : IF a$="0" :
 a$="."
 3460 a%=a%+63 : IF a%>90 : a%=a%+4
 3470 PRINT TAB(10*b%+3) CHR$a%+STRIN
G$(4-LENa$," ")+a$; : ENDPROC
 3480 :
 3490 DEF PROCnames
 3500 RESTORE 4280 : READ h$ : PROChe
ad("=") : FOR I%=1 TO 8 : READ t$ : P
RINT TAB(2) t$ : NEXT
 3510 RESTORE 4260
 3520 FOR J%=0 TO 1 : READ h$ : IF va
rtype%(J%)<>0 : PROChead("-") : PROCe
ntries(Q%!(J%*4),0,0)
 3530 NEXT
 3540 FOR J%=2 TO 7 : READ h$ : IF va
```

```
rtype%(J%)=0 : NEXT : ELSE PROChead("
-") : FOR I%=8 TO 220 STEP 4 : PROCen
tries(I%!Q%,J%-2*(J%>5),0) : NEXT,
 3550 FOR J%=8 TO 9 : READ h$ : IF va
rtype%(J%)<>0 : PROChead("-") : PROCe
ntries(Q%!(J%*4+192),0,0)
 3560 NEXT
 3570 PROCfoot : ENDPROC
 3580 :
 3590 DEF PROCnrefs
 3600 RESTORE 4290 : READ h$ : PROChe
ad("=") : PROCrkey : PRINT'
 3610 RESTORE 4340
 3620 FOR J%=0 TO 1 : READ h$ : IF va
rtype%(J%)<>0 : PROChead("-") : PROCe
ntries(Q%!(J%*4),0,1)
 3630 NEXT
 3640 READ h$ : I%=0 : FOR J%=2 TO 7
: I%=I%+vartype%(J%) : NEXT
 3650 IF I%<>0 : PROChead("-") : FOR
I%=8 TO 220 STEP 4 : PROCentries(I%!Q
%,0,1) : NEXT
 3660 FOR J%=8 TO 9 : READ h$ : IF va
rtype%(J%)<>0 : PROChead("-") : PROCe
ntries(Q%!(J%*4+192),0,J%-6)
 3670 NEXT
 3680 PROCfoot : ENDPROC
 3690 :
 3700 DEF PROCrkey : RESTORE 4300
 3710 IF w%<80 : FOR I%=1 TO 30 : REA
D t$ : PRINTt$ : NEXT : ENDPROC
 3720 READ h$ : PROChead(" ")
 3730 FOR I%=4 TO 17 : RESTORE 4290 :
 FOR J%=1 TO I% : READ t$ : NEXT
 3740 PRINT SPC(2*w%/5-32); t$; SPC(w
%/2-LENt$+16-w%/5);
 3750 FOR J%=1 TO 14 : READ t$ : NEXT
 : PRINT t$
 3760 NEXT : ENDPROC
 3770 :
 3780 DEF PROCentries(X%,I%,r%) : IF
X%=0 : ENDPROC
 3790 REPEAT : n$=$(X%+5) : T%=X%?4 :
 Y%=X%!2 AND G% : X%=!X% AND G%
 3800 IF T%=I% OR I%=0 : PRINT'TAB(2)
 n$ : IF r% : PROCrefs
 3810 UNTILX%=0 : ENDPROC
 3820 :
 3830 DEF PROCrefs
 3840 c%=FNrefs(Y%,"Set  :",0) : IF c
%=0 : VDU 7 : PRINT "<=== Not set" :
ELSE IF c%>1 AND r%>1 : VDU 7 : PRINT
TAB(13)"**** Set more than once"
 3850 IF FNrefs(Y%,"Used :",1)=0 : VD
U 7 : PRINT "<=== Not used"' : ELSE P
RINT'
 3860 ENDPROC
 3870 :
 3880 DEF FNrefs(Y%,t$,x%) : LOCALc%
: PRINT TAB(5) t$; TAB(13);
 3890 REPEAT : S%=(Y%!2) AND G% : U%=
Y%?4 : Y%=!Y% AND G% : u%=U% AND &F0
 3900 IF u%=128 AND x%=0 OR u%<>128 A
ND x%=1 : PROCprnt(FNctx) : c%=c%+1
 3910 UNTIL Y%=0 : =c%
 3920 :
 3930 DEF FNctx
 3940 IF r%=2 AND u%=128 OR r%=3 : ="
"
 3950 IF u%>=128 : c$=" ("+MID$("=ALD
BFN..KQR..Y.",1+(U% AND 15),1) : ELSE
 c$=" ("+MID$("=PVIUFTS#WQCOGYZ",1+(U
% AND 15),1)
 3960 IF U% AND 16 : c$=c$+"f"
 3970 IF U% AND 32 : c$=c$+"a"
 3980 IF U% AND 64 : c$=c$+"i"
 3990 IF u%>128 : =c$+"+)" : ELSE =c$
+")"
 4000 :
 4010 DEF PROClrefs
 4020 X%=Q%!232 : IF X%=0 : ENDPROC
 4030 RESTORE 4350 : READ h$ : PROChe
ad("=") : tst%=0
 4040 REPEAT : READ h$
 4050 O%=(X%!4) : IF O% DIV K%=tst% :
 PROClentry
 4060 tst%=tst%+1 : UNTIL X%=0 : PROC
foot : ENDPROC
 4070 :
 4080 DEF PROClentry : PROChead("-")
 4090 REPEAT : O%=O% AND G% : IF O%=&
FFFF : PRINT TAB(7)"*"; : ELSE IF tst
%<6 : PRINT TAB(3) O%; : ELSE PRINT T
AB(3) ~O%;
 4100 PRINT " :" TAB(13); : Y%=X%+2 :
 X%=!X% AND G% : O%=X%!4 : Y%=!Y% AND
 G%
 4110 REPEAT : S%=(Y%!2) AND G% : Y%=
!Y% AND G% : PROCprnt("") : UNTIL Y%=
0 : PRINT' : UNTIL O% DIV K%>tst% : E
NDPROC
 4120 :
 4130 DEF PROCprnt(c$)
 4140 IF LENc$<8 : c$=c$+STRING$(8-LE
Nc$," ")
 4150 IF COUNT>w%-13 : PRINT 'TAB(13);
 4160 PRINT S% c$; : ENDPROC
 4170 :
 4180 DEF PROChead(a$) : PRINT 'h$ "
" STRING$(w%-LENh$-1,a$)' : ENDPROC
 4190 :
 4200 DEF PROCfoot : PRINT 'STRING$(w
%,"=");
 4210 IF p% : X=TIME : REPEAT : UNTIL
 TIME-X>250 : ELSE PRINT "Press any k
ey to continue" : X=GET
 4220 VDU 12 : ENDPROC
 4230 :
 4240 DATA All details,A, Summary,S,,
, Names used,N, Name references,R, Li
ne references,L,,,Exit,E
 4250 DATA SUMMARY
 4260 DATA System Variables,Resident
Integers,Integers,Integer Arrays,Real
s,Real Arrays,Strings,String Arrays,F
unctions,Procedures,Line refs
 4270 DATA CATALOGUE USEAGE
 4280 DATA NAMES USED,Key to subscrip
t/argument codes,,#  Numeric subscrip
t or argument,$  String argument,*  U
ndefined (ie Function argument),,note
 that all refs with a '*' should,have
 a matching ref with a '#' or '$'
 4290 DATA CROSS REFERENCES
 4300 DATA Key to cross reference cod
es:,,=  Used in an assignment stateme
nt,A  Argument as passed to FN/PROC,B
  Byte array declaration,C  CALL Para
meter,D  Array declaration,F  FOR var
iable or initial value
 4310 DATA G  GOTO or GOSUB line-numb
er,I  IF expression,K  INPUT (from Ke
yboard),L  LOCAL declaration,N  NEXT
statement,O  ON expression,P  Procedu
re Parameter
 4320 DATA Q  Random Access (INPUT#/B
PUT#/PRINT#),R  READ data value,S  ST
EP value,T  TO (final FOR-loop value)
,U  UNTIL expression,V  Value returne
d by Function,W  Write (PRINT to scre
en/printer)
 4330 DATA Y  Assembler address,Z  Ot
her use in assembler,#  Random access
 channel number,,+  Used in setting a
nother-variable,a  Used as an array s
ubscript,f  Used as a function parame
ter,i  Used by indirection operator (
!?$)
 4340 DATA System Variables,Resident
Integers, Ordinary Variables,Function
s,Procedures
 4350 DATA LINE REFERENCES etc.,GOTO,
GOSUB,RESTORE,DATA,ERROR,TRACE,CALL,U
SR
```

This listing is included in this month's cassette tape offer. See order form on Page 215.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CHALLENGER 3

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Opus announce the biggest disc drive breakthrough for years – CHALLENGER. It could make every other disc system for the BBC micro outdated overnight.

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5¼" DOUBLE-SIDED 40/80 TRACK DISC DRIVE

DOUBLE DENSITY DISC INTERFACE

SUPER FAST SOLID STATE RAM DISC – Up to 20 times faster than disc drive and providing a massive 256 K of RAM

ALL THIS IN A SINGLE UNIT FOR AN AMAZING £249.95

And just look at the storage capacity of this remarkable stand-alone system.

Our 5¼" disc drive and built in double-density disc interface – an extended version of the highly praised Opus DDOS, voted fastest system by 'Acorn User' and favourite choice of 'A & B Computing' – combine to give you a powerful 1 Megabyte system. But Challenger has a third dimension, a super fast Solid State RAM DISC for instant access to an additional 256 K of RAM. Effectively a lightning fast second disc drive which can be upgraded to ½ Megabyte capacity for only £49.95. It makes Challenger superior to a dual disc drive, giving faster access and less wear and tear on your drive.

Challenger uses the same disc controller chip as the new BBC B+ computer making it compatible with all leading software titles. Call us for our full compatibility listing.

We've provided a selection of utilities on ROM and Challenger's disc drive is 40/80 track switchable. The extended DDOS takes no User RAM, PAGE, the position at which BASIC programs load, is left unchanged, normally staying at &0E00, and Challenger dynamically moves files on the disc to overcome the 'can't extend' problem.

Challenger's price of £249.95 includes our unbeatable two year warranty, a full operating manual, VAT and free delivery. Call us now on 0737-65080 for details of our nationwide dealer network or simply post the coupon below.

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account with the amount of £________

My Access ☐ Barclaycard ☐ no. is: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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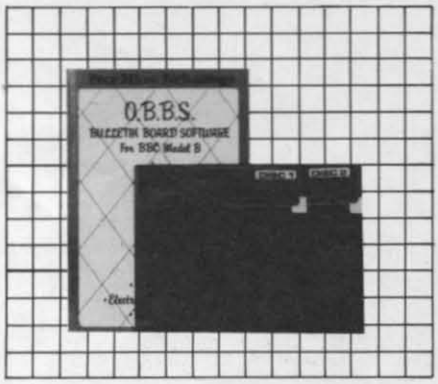
New from Pace

Nightingale Accessory Board

This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering. Nightingale and accessory board, a complete solution.

Accessory Board £49 plus VAT
Dialing Software £10 plus VAT

NIGHTINGALE
ACCESSORY BOARD
PACE



OBBS Colour Bulletin Board Software

Transform your BBC Micro into a unique bulletin board, be your own sysop. If you already own a Nightingale modem fitted with the accessory board or indeed if you intend buying this combination, with OBBS coloured Bulletin Board Software, you can run your own bulletin board. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility.

£21 plus VAT

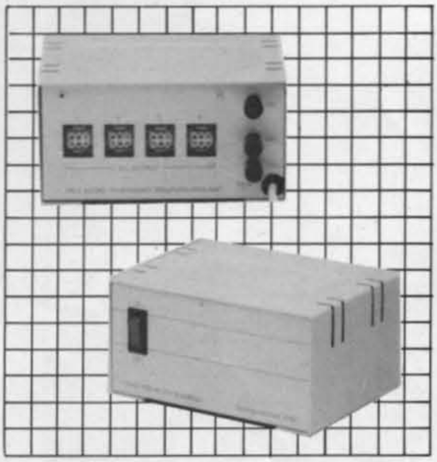
Independent Power Supply

We have designed this Independent Power Supply for those of you who use disc drives powered from the BBC power supply and are concerned that with the addition of Sideways ROM boards etc., the psu is being overloaded. The Pace independent power supply unit plugs directly into the mains and has four power output sockets of the type used on the BBC. This means that you can plug your unpowered disc drives, buggies etc., directly into this unit thus removing the strain from the BBC power Supply.

Technically speaking, the Pace Independent PSU takes 240V AC mains and gives out regulated +5V & +12V DC (±2%) and OV power through 4 parallel sockets. These sockets are of the same type as provided at the Auxilliary power output socket of the BBC microcomputer. Push connectors are also provided for all three voltage levels.

The unit is capable of supplying two single disc drives or one dual disc drive plus one or two other devices, such as Eprom programmers, which draw less current. The maximum current available is approximately **1.5A @ +5V** and **1.2A @ +12V.**

£39 plus VAT



All the above are available from good quality dealers throughout the country or direct from Pace. Payment accepted by cheque, Access or Visa.

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Leonardo Da Vinci, Isambard Kingdom Brunel, Guglielmo Marconi, Albert Einstein, Jack Kilbey, Touch Pad...and your imagination.

SCREEN
ARTIST

One thing all the above gentlemen had in common was sheer genius. With the new, improved Cumana Touch Pad, together with your imagination, you can produce designs, pictures, and circuit diagrams that would be the envy of the most inventive mind.

Touch Pad is an easy-to-use graphics plotting aid with a brand new powerful software program called Screen Artist, for anything from interior design, designing electrical circuits and pictures for the "budding artist" to teaching handwriting co-ordination to young children. There is a tremendous range of applications which can be applied to a variety of home users, businesses and educational establishments.

Screen Artist includes many features as standard – circle, square, rectangle and triangle sizes are easily varied and, at a touch of a button, can be outline or solid. Writing can be drawn at any angle or size on the screen with an added feature "tail" to give a 3D effect.

By the way, in case you're wondering, Jack Kilbey invented the integrated circuit!

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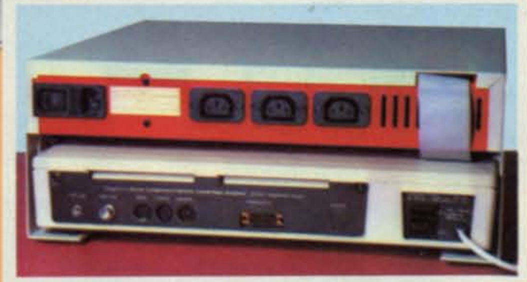
*Software developed by Microdraw Ltd.

If you think the front looks good – you should see the back.



Once again
Mushroom has answered a
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users with their new WORKSTATION — no more untidy wiring, no more pulled plugs, transforms your system into a handsome console unit.

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The WORKSTATION is manufactured to the highest safety specifications from lightweight aluminium attractively finished in oatmeal with orange trim. When not in use the computer is stored underneath, affording useful protection from accidental knocks or spillage.

The WORKSTATION, complete with twin disc drives, is suitable for all. Areas of use — Domestic, Schools, Local Authorities, Commercial and Industrial.

This is a must for every user at only £399.00 Exc. VAT.

Those people already owning disc drives can have them fitted into the WORKSTATION. Prices on request.

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Patents pending.

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Telephone: (0234) 58303. Telex: 826112 MUSCOM G, and selected computer dealers nationwide.

WORD SQUARE

KEVIN EDWARDS has dreamed up a cunning way of designing those infuriating puzzles

HAVE you ever attempted to solve a word square? I'd be very surprised if your reply is No. People spend hours and hours of their spare time trying to find words among a jumble of letters. The craze is so big that millions of magazines crammed with the mind-boggling puzzled have been sold.

Wouldn't it be fun if you could use your BBC Micro to design your own word squares? And think of the money you'd save if you swapped your creations with your friends. That's why we've come up with a word square designer.

Actually we've only given you the framework – before you can use it you must add several DATA lines to the end of the program.

The first must contain tne dimensions of the word square – width followed by height. Therefore, the line below indicates that the square is 12 characters wide by 14 high.

```
5010 DATA 12,14
```

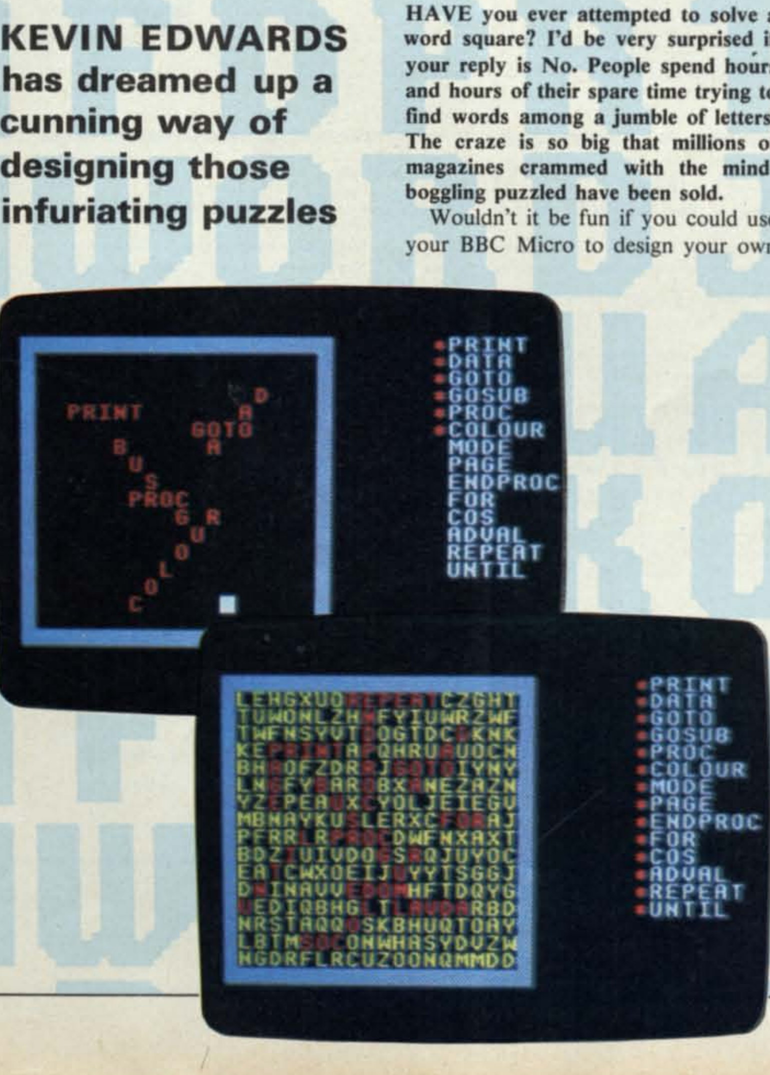
As we're using Mode 1, the maximum size of word square allowed is 23 by 22 – perfectly suitable for most cases.

The other DATA lines required contain the words which are going to be hidden in the word square. The end of this list is terminated by the word THEEND – no space in the middle.

Try adding the following lines to the program:

```
5000 REM width,height
5010 DATA 15,15
5020 REM the words
5030 DATA PRINT,GOTO,PROC
5040 DATA GOSUB,ADVAL,PLOT
5050 DATA "THEEND"
```

It is vital that you don't accidentally add spaces to the end of the DATA lines


PRINT
GOTO
D
A
A
B
U
S
PROC
G
R
U
O
L
O
C
*PRINT
*DATA
*GOTO
*GOSUB
*PROC
*COLOUR
MODE
PAGE
ENDPROC
FOR
COS
ADVAL
REPEAT
UNTIL
*PRINT
*DATA
*GOTO
*GOSUB
*PROC
*COLOUR
*MODE
*PAGE
*ENDPROC
*FOR
*COS
*ADVAL
*REPEAT
*UNTIL

→

From Page 97

when typing them in. If you do they will be included in the strings containing the words when the data is read.

Remember, spaces are valid characters in strings.

Once all the relevant information has been included in the program you can RUN it. This will display a box at the left side of the screen and the words to the right of it.

At the top left of the box is a solid block. This is the cursor which you move using the corresponding cursor arrow keys.

The first word in the list must now be placed in the box. All you do is move the cursor to a suitable position and press the Return key. This indicates where the first letter of the word will be.

A block is also printed in the top left corner of the screen showing that the start position has been given.

Next move the cursor in the direction you want the word to go. For example, move down one row if you want the word down the screen. The program allows you to place a word in any of the possible eight directions – N, NE, E, SE and so on – thus permitting vertical, horizontal, diagonal and reverse words.

When a valid position has been selected the word is displayed in the box and its position in the list marked with an asterisk, indicating that it has been used.

There are two points which must be noted:

The first concerns words near the edges of the box. All the letters in the word must be within the box. If you try to position a word in which letters will be outside the box, a beep (VDU 7) will be generated. The word is not accepted under these circumstances.

The second point concerns overlapping words. If a word is going to overlap with another, the character(s) where the two intercept must be identical. Again, if an invalid entry is made a beep will occur.

Once all the words have been set up the blank spaces are filled with random letters – in a different colour to the hidden words. You are now asked if you want a print output. If your reply is Y the word square is printed out.

This printout can now be marked with the solution for later reference. If you don't have access to a printer you can make a list of the start positions of the words.

The next question asks you if you want to save the word square data. Responding with Y spools the data to disc or tape. The word square data files can be loaded and solved using the word square solver which will be listed next month. This allows you to build up a library of word square puzzles for solution by a friend or yourself.

Anyway, that's enough about the program. Now you can start designing your own word squares. Happy puzzling.

Listing starts on Page 165

QUAL-SOFT **THOUGHTWARE** **Sports simulations**

"Thanks for a soccer game that doesn't assume all soccer fans are mentally retarded or only 6 years old". W. Whitworth, Stoke-on-Trent.

"I find the packaging of this game beaten by only Revs and Elite, and the contents of the game beaten by none". Jason Sinclair, Leeds.

Qual Soft comment: We are pleased to be compared with these excellent games and would point out that we are also **£5 CHEAPER THAN EITHER!!!**

In 1966 Alf Ramsey proved that English club soccer players, with intelligent management, could not only dominate European club football, but could take on, and beat the rest of the world at International level. Could you do the same in ....

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TAPE 1 (Qualifiers)

★ Current squad of 16 players + 20 user defined players.
★ Friendlies in Paris, at Wembley + South American tour.
★ ANY team formation you choose. 2 from 5 substitutes.
★ In match tactics: any no. of individual player adjustments.
★ Your qualification group: full results and table.

TAPE 2 (Finals)

★ Choose a 20 man squad to take to the finals.
★ Group of 4 prelims. 16 to final knockout comp.
★ Extra Time, PENALTY SHOOT-OUTS, where relevant.
★ Formation and strength information on opposition.
★ 2 from 9 substitutes (the FA tells us so).

ENGLAND'S GAMES: FULL PITCH, 22 MAN, 3D GRAPHICS & SOUND EFFECTS

QUAL-SOFT comments: With 5 levels of play, 12 depths of sophistication, and "fun" graphics, this game can be enjoyed by an 8 year old youngster as a "fun" game, and by the most sophisticated as a tactical/strategy challenge of the highest order.

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THE NUMBER ONE TOOLKIT ROM FROM CLARES

*EDIT is a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

*ERROR ON will trap errors in a program and enter the EDITOR at the statement generating the error, no more wading through multi statement lines trying to identify the error.

Commands pioneered by BROM are:

*ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK. This also allows the DFS to be swtiched off and PAGE reverts to &E00 automatically.

*CASE which forces input into upper or lower case irrespective of caps/shift lock.

*FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS'.

*ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

*FIND, *CHANGE & *SCHANGE provide selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. *FIND PROChelp T', will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

This is a genuine useful ROM that no user should be without. Be warned, once used you will not be able to live without it!

"This is the best BASIC screen editor I have so far used." MICRO USER August 85.

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FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

"there is nothing of the quality of this suite of programs" EDUCATIONAL COMPUTING

New! PROFILE 40 80 3" £12.00

A PROCEDURE LIBRARY MANAGEMENT SYSTEM

Now you can start the procedure library that you always promised yourself. PROFILE allows you to store, list, merge and grab procedures without any of the headaches. Automatic alteration of LINE NUMBERS and resident variables such as TOP, LOMEM etc. release you from the tedious chore of setting and resetting, checking and rechecking. PROFILE leaves you free to create your programs without disturbing your chain of thoughts.

*100 Procedures can be stored on each disc (disc space allowing)
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*MERGE Procedures into your programs easily
*LIST Procedures from disc to check suitability etc.
*RENAME Procedures on disc
*GRAB new Procedures from existing programs
*NESTED Procedures can also be grabbed automatically

A Procedure can be a FUNCTION, a BASIC program or part of it or a PROCEDURE.

With PROFILE you will quickly amass a wealth of procedures which will enable you to write programs quickly and easily. Simply write the controlling program containing the procedure calls and PROFILE will merge the procedure for you.

PROFILE in effect provides you with a MACRO BASIC in which you only have to define the procedure once and it can be re-used automatically thereafter.

Make life easier for yourself and order PROFILE today.

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Datapen

TURBOBALL

Now add "go faster" goodies to your TRAK-BALL

The ATARI TRAK-BALL has a superb resolution when used with the BBC Micro's user port, but, in common with all trackerball and mouse devices, is slow when moving from one side of the screen to the other. With menu driven programs this can be annoying, but now with TURBOBALL you can zap at incredible speed to anywhere on the screen, while still retaining the same resolution when required.
TURBOBALL also provides two extra button switches making the ATARI TRAK-BALL compatible with other 3 switch mouse and trackerball devices. In addition we have provided X HOLD and Y HOLD buttons which make vertical and horizontal alignment a dream.

- Two auxiliary switches
- X and Y freeze facility
- Fully adjustable "fast" speed
- Special deal on SPLASH! art program
- Simple clip fitting – no alteration to your TRAK-BALL

SPLASH!

Superb art drawing program for the BBC Micro

Especially commissioned from Tecnation for the launch of our TURBOBALL interface, this Super-fast machine code program is packed with all the features you need to produce arty Mode 2 screen dumps that you can be really proud of. The on-screen menu makes it easy for even a pre-school child to get excellent pictures, yet the combination of commands available allow you to generate amazing results with no effort at all. Some of the "trick" GCOL effects just have to be seen to be believed.
Although intended for computer artistry this program contains enough geometric and "technical" drawing commands to make it a SPLASH! with every type of user.

- Fully screen menu driven
- Trackerball operation
- Circles, ellipses, triangles, rectangles, etc.
- Brush and line thickness control
- Fast machine code program, a joy to use
- Fast solid and pattern filling routines
- Rotating pattern menu
- "Trick" colour effects available on all commands
- Superb multicolour text effects
- Spray paint, solid or patterned
- Full 16 colour operation

ATARI TRAK-BALL £19.95

TURBOBALL
x hold
fast
y hold
aux b

TURBOBALL Interface £29.95

SPLASH! £13.95
(on disc only, specify 40T or 80T)

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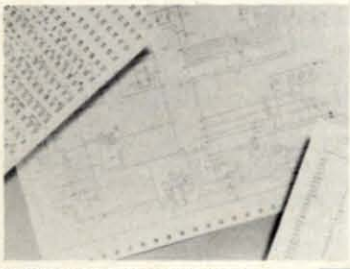

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MOLECULE

Fire rays into an observation chamber to deduce a molecule's structure in this unique and intellectual puzzle by DANIEL BISHOP

MOLECULE is a game of logic and deduction for one person versus the computer. The object is to deduce by experiment, as quickly as possible, the structure of a molecule which is set up for you by the micro.

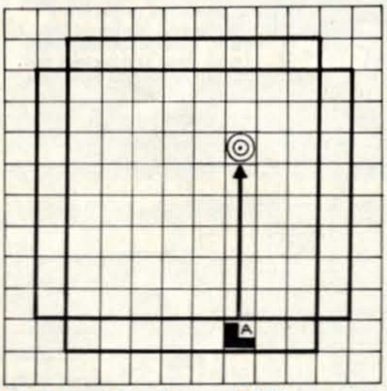
You must fire rays into a chamber and observe how the atoms in the chamber absorb, reflect and deflect the rays.

As the atoms make up the molecule by noting the path of the rays you will gather clues to its structure. Every game is virtually unique and an intellectually stimulating puzzle.

Molecule has been tested on both the BBC Mico and Electron. It is recommended that you use either a colour TV or colour monitor to get the most from it.

When you run the program the bottom of the screen displays all the alphanumeric commands for use during the game.

The centre of the screen shows a large rectangle with a panel along each side. The large rectangle is the chamber. The panels are where the rays are fired from.

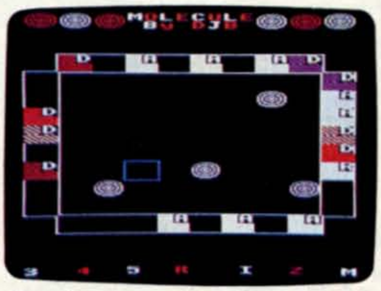


Simple absorption: Any ray which hits an atom is absorbed. This happens frequently and is a fundamental property of rays.

In the top panel is a small coloured rectangle, your cursor, which you move around using the arrow keys. It can be moved into any of the panels, as well as the chamber itself. Note also that it has wrap-around.

The chamber and panels are initially empty but as the game progresses various symbols will appear in both. However within the chamber, although not visible, are a number of atoms. They make up the molecule. Each atom is the size of the cursor.

Your job is to detect where the atoms are in the chamber. Initially there are only three to locate, but in harder games there may be up to five. Note that the atoms are stationary throughout the game – they don't run away!

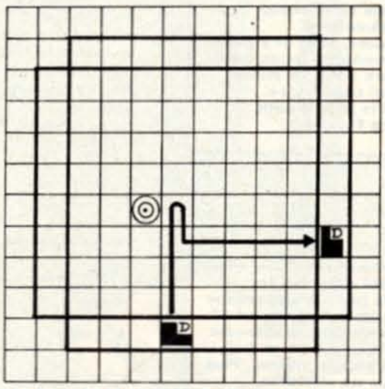


Games in progress . . . 4 atoms

To help you find them you fire rays into the chamber and the result will give you clues as to the atomic locations.

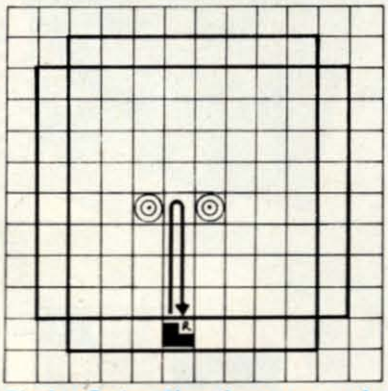
To fire a ray, move the cursor into any panel. At this stage each panel consists of eight units and the chamber itself is a rectangle of 8 x 8 units.

When you have done this, press Z. Immediately one or two symbols will appear in the panels, one of which will always be inside your cursor. These are the clues. When you fire a ray it will travel into the chamber from the cursor position, a symbol appearing inside the cursor to show where it came from.



Deflection: This describes the other fundamental property of rays. A ray which approaches an atom closely is deflected from its original path through 90 degrees. Note the U shaped overshoot which the ray path follows. This is important in determining the behaviour of rays in more complex situations.

Rays travel only up, down, left or right, and never diagonally or at any other angle. Wherever a ray emerges from the chamber, another symbol appears.



Simple reflection: Shows how a ray can be deflected twice, simultaneously, and hence the path of the ray is turned through 180 degrees. The ray returns to its origin so it is said to be reflected.

As rays travel through the chamber they are affected if they come close to, or hit, an atom. A number of things can happen and you would be well advised to study the example diagrams to understand how rays can be absorbed, reflected and deflected.

If a ray is absorbed, a white A appears inside the cursor. If reflected, a white R appears and if deflected, one coloured D appears inside the cursor and another of the same colour turns up wherever the ray emerged.

Thus if there is absorption or reflection, only one symbol appears. But

VARIABLES

GRID%(9,9)	Contents of chamber and panels.
ATOM%(9,9)	Locations of the atoms.
COL%(12,2)	Three "dithering" colours for each of the 12 deflection symbols.
ATOM%	Number of atoms in molecule.
ATOM$	Atom marker.
AB$	Absorption symbol.
REFLECT$	Reflection symbol.
RAND%	Is number of atoms in molecule random?
SCORE%	Final score.
DFL%	Number of deflections so far.
CURSX%	Cursor's x position in grid.
CURSY%	Cursor's y position in grid.
USER$	Your command.

PROGRAM STRUCTURE

10-90	REMarks.
100-270	Once only initialisation.
280-350	Every game initialisation.
360-470	Get and act upon user's command.
480-660	Draw screen display.
670-690	Draw rectangular cursor.
700-820	End of game routine.
830-860	Set number of atoms for next game.
870-1040	Move cursor.
1050-1320	Calculate ray path and print result symbols.
1330-1370	Place or remove atom markers.
1380-1580	Playing instructions.
1590-1640	Page instructions.
1650-1720	Print deflection symbol.

Listing starts on Page 172

if there is deflection, there are two.

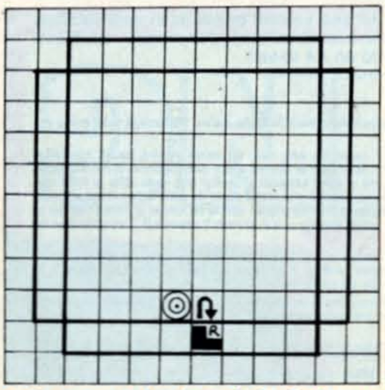
Deflections generally give more information about the molecule than do reflections or absorptions, but you will usually get less of them.

You may not exceed 12 deflections (24 coloured symbols). If you do get as many as this, which is unlikely, you cannot fire any more rays and must proceed to the end of the game.

The computer will not stop you from firing rays where rays have previously been fired, but there is no point in doing so, since you already know the result. Also you will be penalised.

After you have fired a few rays you should start gaining some idea as to where the atoms lie. To help you visualise the set-up, you may place markers in the chamber. Simply move the cursor into the chamber and press Z.

You may place as many as you like and also remove ones previously placed. To do this, move the cursor over the atom marker and press Z again.

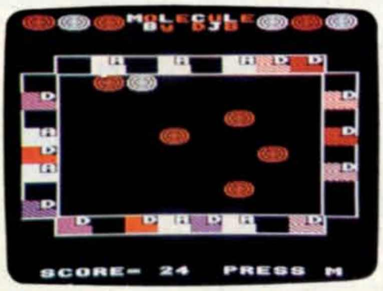


Reflection at an edge: A ray which is fired near to an atom at the edge of the chamber is also reflected.

When you think you know where all the atoms are you are ready to finish.

First make sure that each location of a suspected atom is tagged and that excess atom markers are removed. When you feel that the chamber display shows the exact arrangement of atoms press M.

Red atom markers will then appear in the chamber showing the true location of the atoms. Your markers will turn red if they are correct, but remain white if they are wrong.



```
SCORE- 24   PRESS M
```

Game over – one incorrect . . . 5 atoms

Your score is printed at the bottom of the display. The lower your score, the better you have done. To start a new game, press M.

The scoring system is simple. You get one point for every symbol in the panels, and five for every atom that was in the wrong place, extra or missing.

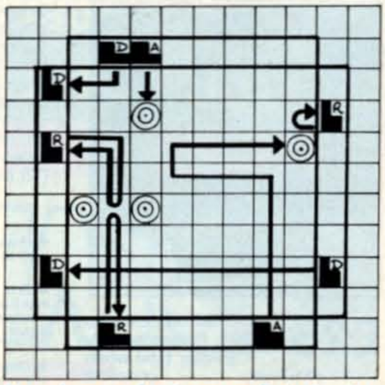
So to achieve a low score it is important not to fire more rays than absolutely necessary and to be as sure as you can about the molecular structure before pressing M.

Throughout the game you'll see the command keys displayed at the bottom of the screen:

3	Start with three atoms.
4	Start with four atoms.
5	Start with five atoms.
R	Start with a random number of atoms (between three and five).
I	Call up brief instructions. You will be returned to where you left off.
Z	Fire ray or place atom marker.
M	Molecule! Ends the game by displaying atoms and your score.

When you first run the program the computer will by default give you a molecule with three atoms to find. You can change this by pressing 4, 5 or R.

You needn't keep pressing these keys at the beginning of every game. Just press 3, 4, 5 or R when you wish to change.



Example ray paths: A more realistic situation, with four atoms in the chamber. For the sake of clarity overshoots have not been drawn in but absorptions, deflections and reflections can all be seen. Some rays undergo a number of these effects before they finally leave the chamber. At the other extreme, some rays may pass straight through the chamber. They are still recorded as deflections.

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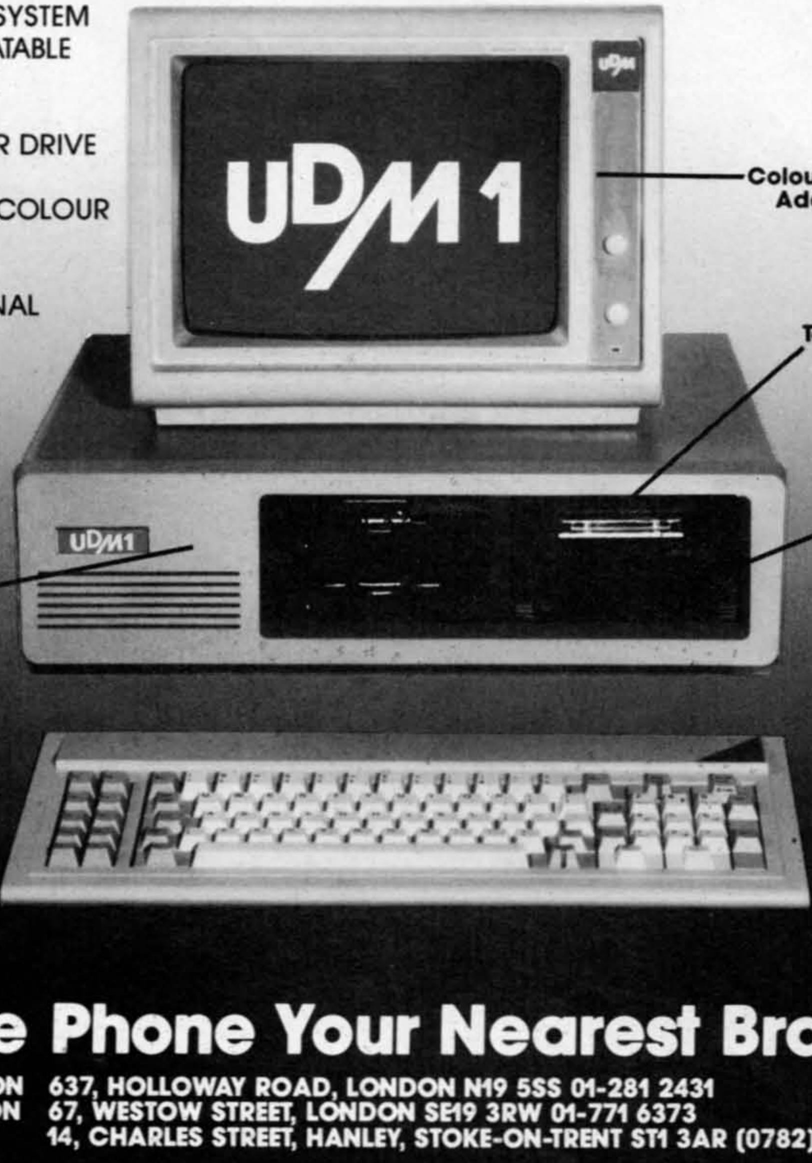

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6502...Z80...68000?

Cross assemblers give you the best of all worlds

HAVE you ever wished your BBC Micro had a Z80 instead of a 6502 for its microprocessor? Or better still, a 68000? Well now it can – or rather it can pretend it can – thanks to two new cross assemblers from the appropriately named Crossware Products.

A cross assembler is simply a program that lets you generate machine code for one microprocessor on a machine based on another. Of course, you can't run the resulting code – after all, the whole point is that it's for a different processor.

However, with the BBC Micro's amazing I/O capabilities, you can "port" the code to the micro you're writing for and see if it works as expected. This way you can get the power and comfort of the BBC Micro's programming environment while you develop the code for lesser micros.

Crossware actually have a wide range of cross assemblers for the BBC Micro with Basic 2. In this review I'm concentrating on the 8 bit Z80 and the 16 bit 68000, but the points I make apply to all of them.

A large number of home micros, including the ZX-Spectrum and Amstrad range, are Z80 based. Thus a programmer could take advantage of an existing BBC Micro system to write Spectrum programs.

As for the 68000, a look at the specifications for various new micros reveals that it is being chosen in favour of other well established processors. Have we at last entered the 16/32 bit era?

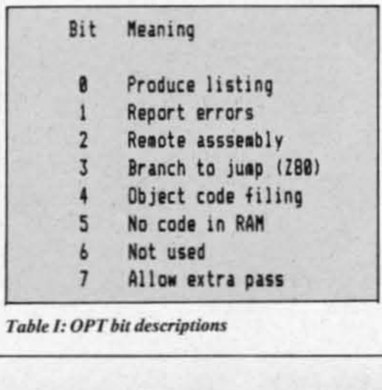
Anyway, back to the cross assemblers. Each package consists of a plastic wallet containing an instruction manual and two 40 or 80 track discs. In fact the software is on one disc, the other is a free backup copy. The 68000 version has an additional disc filled with example programs.

The manuals supplied with all Crossware's 8 bit cross assemblers are identical. However, the one with the 68000 is slightly different and contains an appendix which gives details of possible pitfalls and problems that can be encountered using the 68000 instruction set.

By KEVIN EDWARDS

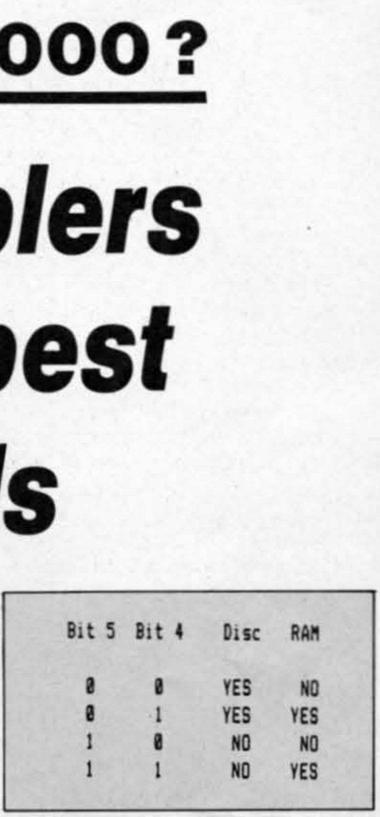
Both manuals assume the reader has a reasonable knowledge of the processor in question. Quite correctly, they make no attempt to explain the instruction set of each.

The assembler is initialised simply by *RUNning a file and remains active until Ctrl+Break is pressed.



Bit	Meaning
0	Produce listing
1	Report errors
2	Remote asssembly
3	Branch to jump (Z80)
4	Object code filing
5	No code in RAM
6	Not used
7	Allow extra pass

Table I: OPT bit descriptions



Bit 5	Bit 4	Disc	RAM
0	0	YES	NO
0	1	YES	YES
1	0	NO	NO
1	1	NO	YES

Table II: Object code destination

Since the program loads at &1900 (versions running at other locations are available on request) PAGE has to be increased to accommodate the code – &2D00 for the Z80 version and &3400 on the 68000!

Crossware have integrated their assemblers with the BBC Micro's resident assembler, the main difference being the way in which the assembler is entered. Instead of using the left square bracket the command *MCODE is used. This can be directly followed by an OPT command in the usual way.

The BBC Micro's 6502 assembler only makes use of bits 0 to 2 of the OPT number. However, Crossware have enhanced the options available – see Table I.

These options allow greater control over the object code destination as shown in Table II. For example, it is possible to assemble a program and store the object code on disc and not in memory. This form of disc to disc assembly is very advantageous since no RAM is required for the object code –

→

From Page 107

rather important when PAGE is at &3400.

If you wish, you can assemble a program without producing any object code, which is useful when checking source files for silly mistakes.

The 'branch to jump' pass option permits the cross-assembler to change out-of-range relative branches to jumps. This is only relevant to 6801, 6805 and Z80 processors, since these support conditional jumps.

Crossware have also provided facilities for procedure overlaying. Whenever Basic fails to locate a procedure definition the P directory of the current drive is used as a procedure library. If a file with the same name as the procedure call is located it is loaded into memory, executed and then deleted from RAM. Overlaying procedures in this way permits extremely large programs to be assembled.

Also available is conditional assembly by use of IF THEN ELSE and ENDIF instructions. This is possible using the BBC Micro's own assembler but involves exiting and re-entering the assembler – a rather messy operation.

A particularly nice feature is the 'duplicate label error' which is generated if the assembler encounters a label which has already been defined. This prevents accidental duplication of symbols – something lacking on the resident assembler. Setting bit 7 of the OPT number disables this feature.

Also on the disc are a couple of useful routines. VDUMP produces a dump of the variables in memory – including strings. This facility is usually only present in toolkit ROMs.

I tend to find that moving from microprocessor to microprocessor causes me to go schizoid. Fortunately, the help utility on the disc gives information about every mnemonic, producing a list of all the addressing modes permitted, flags affected and machine cycles for a selected instruction. In fact, most of the disc is taken up providing this feature.

To summarise, the Crossware cross assemblers are well worth considering. They've been cleverly integrated with Basic to provide a very usable development package – assuming you can transfer data to the target machines. It would have been nice to see a ROM or second processor compatible version. No doubt if the demand is strong enough they will appear.

Highly recommended.

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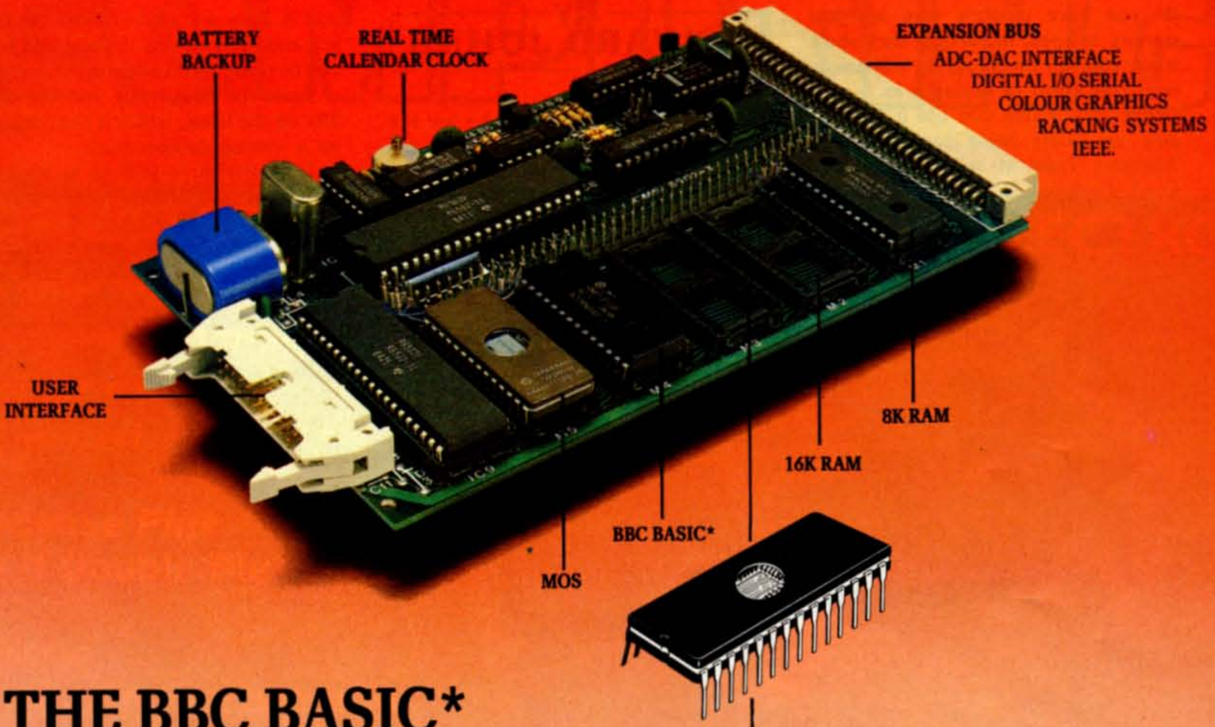
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Learning to spell can be fun when you load up the...

By
EDWARD JOHNS

IF you have toddlers who are just starting to spell, the delight they show when you run this program will amply repay the effort of keying it in.

The idea is that you use a crane to pick up letters being carried by the Alphabet Train in order to spell the word displayed at the bottom of the screen.

Because the word is on-screen the whole time, even children who are not yet ready for spelling can gain important practice at shape matching.

Only a portion of the train shows at any one time, but the letters are arranged in alphabetical order. The Z and X keys are used to move the train left and right so that the required letter can be positioned underneath the crane.

Press the Space Bar and the crane lifts up the letter, which it then deposits on a waiting dumper truck.

It is possible to pick up an incorrect letter, but the efficient workers won't let it drop on to the truck.

Once the word has been built up the truck rolls off to the word factory, after which a new word will be chosen and displayed at the bottom of the screen.

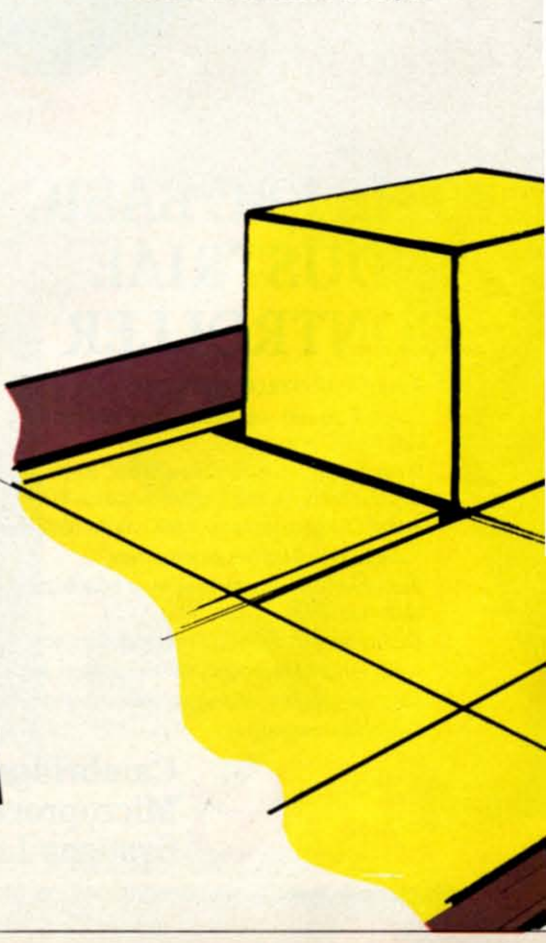
You can change the words chosen by altering the data statements at the end of the program. The first data statement contains the number of words and the remainder are the words which the program chooses at random. They must be less than six letters in length.

VARIABLES

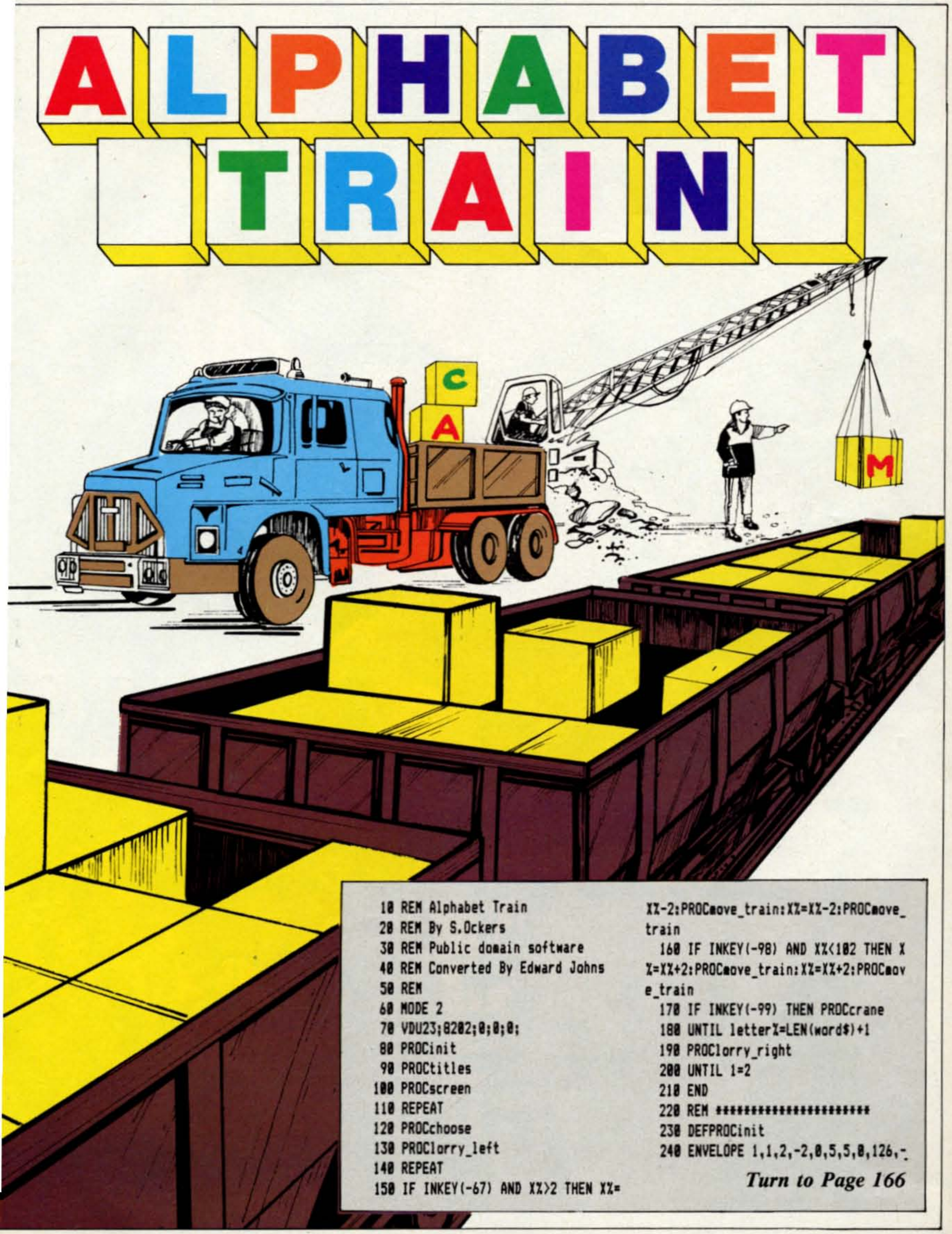
a$	String for the top half of the train graphics.
hook$	String containing the hook graphics.
letter%	Offset into the string word$ which is to be collected next.
wagon$	String containing the train graphics.
word$	Word currently being guessed.
X%	Train's X coordinate.

PROCEDURES

init	Initialises variables, user defined characters and envelopes.
titles	Displays the title page with control keys.
screen	Sets up the screen display in Mode 2.
lorry_left	Moves the lorry left on to the screen.
move_lorry	Displays lorry at defined position on the screen.
move_train	Moves the train either left or right.
short_delay	Pauses for a short time.
change1,change2	Changes the colour palette to make the train appear to move.
crane	Moves crane.
get_letter	Moves the crane's hook down to take a letter.
right_letter	Moves the crane right and deposits the letter on the lorry.
wrong_letter	Rejects letter and places it back on the train.
lorry_right	Moves lorry off the screen.
choose	Selects a random word from the data statements at the end of the program.



ALPHABET TRAIN



```
10 REM Alphabet Train
20 REM By S.Ockers
30 REM Public domain software
40 REM Converted By Edward Johns
50 REM
60 MODE 2
70 VDU23;8202;0;0;0;
80 PROCinit
90 PROCtitles
100 PROCscreen
110 REPEAT
120 PROCchoose
130 PROClorry_left
140 REPEAT
150 IF INKEY(-67) AND X%>2 THEN X%=
X%-2:PROCmove_train:X%=X%-2:PROCmove_
train
  160 IF INKEY(-98) AND X%<102 THEN X
%=X%+2:PROCmove_train:X%=X%+2:PROCmov
e_train
  170 IF INKEY(-99) THEN PROCcrane
  180 UNTIL letter%=LEN(word$)+1
  190 PROClorry_right
  200 UNTIL 1=2
  210 END
  220 REM ***********************
  230 DEFPROCinit
  240 ENVELOPE 1,1,2,-2,0,5,5,0,126,-
```

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Exeter. Open Channel, Central Station, Queen Street. Tel: 0392 218187.
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Plymouth. Computer Base, 21 Market Avenue. Tel: 0752 672128.
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Seaton. Curtis Computer Services, Seaton Computer Shop, 51c Harbour Road. Tel: 0297 22347.
Tiverton. Actron Microcomputers, 37 Bampton Street. Tel: 0884 252854.

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Trowbridge. West Wiltshire Micros, Whiteheart Yard. Tel: 02214 67259.

YORKSHIRE

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Doncaster. Boots, 13-15 French Gate, Tel: 0302 62238.
Barnsley. Boots, 34-40 Cheapside. Tel: 0226 82616.
Huddersfield. Micro World Computers, 1006-1010 Manchester Road, Linthwaite. Tel: 0484 846117.
Huddersfield. Boots, 22 King Street. Tel: 0484 21756.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
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Sheffield. Boots, 4-6 High Street. Tel: 0742 78333.
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Mc BASE

By David McLachlan

McBASE is an extremely powerful file handling program which can be used to store and manipulate data for a wide range of applications.

The initial options allow you to either create a new file or load an existing one. If you opt to create a file you will be asked for details of the record structure.

Records may contain any number of fields – string or integer – up to a maximum of 10, the program catering for variable string field lengths.

Once you have entered the details of your record structure the main menu displays the maximum number of records that the BBC Micro's memory will allow you, maximum 150. Of course the actual number possible varies with the record structure. The following examples will give you some idea of the flexibility:

Number of fields	Length	Records allowed
3	20,8,3	28
5	each 5	21

The main menu offers nine options: Enter, Amend, Sort, Search, Display, Load, Save, Print or Delete data.

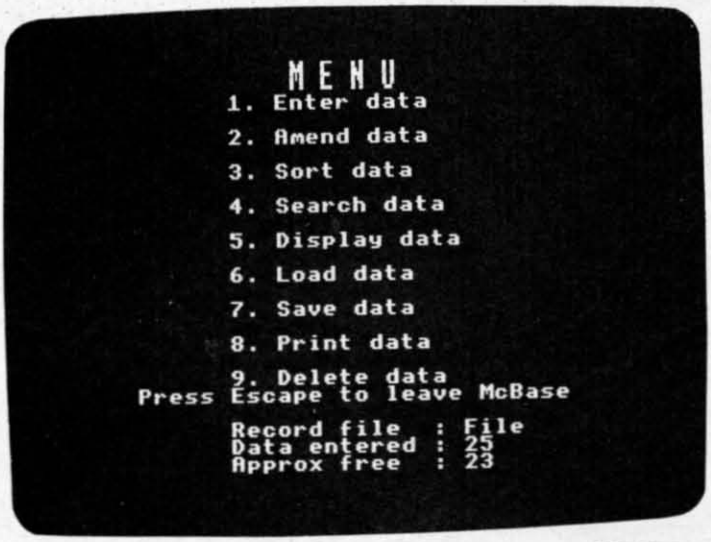
Sub-menus subsequently provide versatile manipulation of your records. For instance you can display or print original, sorted, or marked data.

An interesting programming technique has been used to store marked records.

An area of memory is reserved in line 400 relative to the number of records allowed. When displaying records in option 5, selecting M to mark the record puts a 1 into the memory location reserved for that particular record.

In order to Display, Sort, Search or Print marked data, a loop searches through memory until a 1 is found, whereupon the subroutine carries out the required instruction.

Pressing Escape in any sub-menu will return you immediately to the main menu without loss of data.



```
          MENU
     1. Enter data
     2. Amend data
     3. Sort data
     4. Search data
     5. Display data
     6. Load data
     7. Save data
     8. Print data
     9. Delete data
Press Escape to leave McBase
     Record file   : File
     Data entered : 25
     Approx free   : 23
```

Listing starts on Page 179

MAJOR VARIABLES

no_record%	Number of records allowed.
one_record%	Total bytes per record.
X	Number of records.
F%	Number of fields.
length	Field length.
fsp$	Current filename.
T$	Field titles.
N$	Record number.
LM	Left margin.

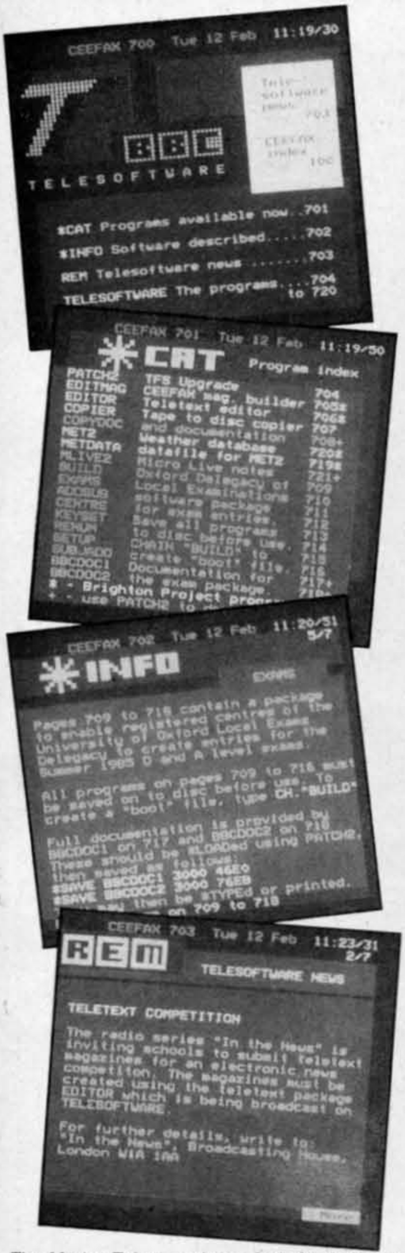
ARRAYS

no_field$( )	Field data.
DAT$( )	Original data.
SD$( )	Sorted data.

PROCEDURES

FNfree	Returns the amount of free memory.
title	Prints the titles.
dataentry	Enters more data.
catalog	Catalogs the disc.
align	Aligns data.
x	Alters *FX6.
a	Aborts printing.

MORLEY ELECTRONICS



```
CEEFAX 700  Tue 12 Feb  11:19/30

TELESOFTWARE
                     Tele-
                     software
                     news 703
                     CEEFAX
                     index 100

*CAT Programs available now..701
*INFO Software described.....702
REM Telesoftware news .......703
TELESOFTWARE The programs....704
                          to 720
```

```
CEEFAX 701  Tue 12 Feb  11:19/50
*CAT         Program index
PATCH2    TFS Upgrade
EDITMAG   CEEFAX mag. builder 704
EDITOR    Teletext editor     705#
COPIER    Tape to disc copier 706#
COPYDOC   and documentation   707
MET2      Weather database    708+
METDATA   datafile for MET2   720#
MLIVE2    Micro Live notes    719#
BUILD     Oxford Delegacy of  721+
EXAMS     Local Examinations  709
ADDSUB    software package    710
CENTRE    for exam entries.   711
KEYSET    Save all programs   712
RENUM     to disc before use. 713
SETUP     CHAIN "BUILD" to    714
SUBJADD   create "boot" file. 715
BBCDOC1   Documentation for   716
BBCDOC2   the exam package.   717+
# - Brighton Project progr    719+
+ - use PATCH2 to
```

```
CEEFAX 702  Tue 12 Feb  11:20/51
                              5/7
*INFO          EXAMS

Pages 709 to 716 contain a package
to enable registered centres of the
University of Oxford Local Exams
Delegacy to create entries for the
Summer 1985 O and A level exams.

All programs on pages 709 to 716 must
be saved on to disc before use. To
create a "boot" file, type CH."BUILD"

Full documentation is provided by
BBCDOC1 on 717 and BBCDOC2 on 718
These should be *LOADed using PATCH2,
then saved as follows:
*SAVE BBCDOC1 3000 46E0
*SAVE BBCDOC2 3000 76EB
         can then be *TYPEd or printed.
              on 709 to 718
```

```
CEEFAX 703  Tue 12 Feb  11:23/31
                              2/7
REM       TELESOFTWARE NEWS

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magazines for an electronic news
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```

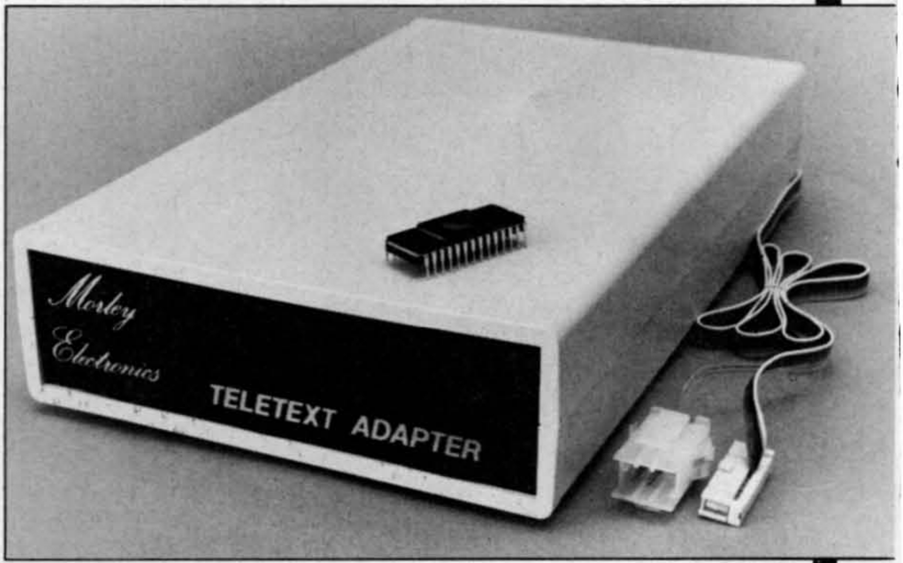

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SQUARES

MARK WARD translates a classroom strategy game enjoyed by countless schoolchildren, and comes up with an interesting new slant – Blind Squares

SQUARES is a great game of strategy and skill for two players. Although traditionally played in the end of term school classrooms with pen and paper, this version allows you to play in the comfort of your own home with either your BBC Micro or a friend as opponent.

For those of you who are unfamiliar with the rules they are:

The game is played on a board which consists of a square lattice of dots.

Each player takes it in turn to draw a line on the grid by joining two of the dots. The two dots joined must be adjacent to each other and the line must be horizontal or vertical.

Play continues alternately until one player can make a move which will complete a square, hence the name of the game. Points are awarded for this and the same player takes another go.

To win you must complete as many squares as possible while at the same time preventing your opponent from completing any.

The controls couldn't be simpler. The cursor keys allow you to move a cross about the screen and to position it above any dot on the board. The dot chosen is then "fixed" by pressing the Copy key. A second dot is then chosen in the same way and, provided that the move is legal, the computer will draw in your line.

A second, more difficult version of the game, Blind Squares, is included in the program. The rules are the same as for Squares except that once you have been shown the line on the board it disappears, leaving you to rely on your memory.

Should you become totally lost however, pressing B during your go will show you the moves made so far on the board. Each time the key is pressed your opponent is awarded points – so be careful not to over-use this facility.

PROCEDURES

choose_line	Lets you choose your line.
auto	Lets the computer consider possible moves.
aut_side	Looks at a move considered by PROCauto and examines how many sides of the adjacent square have been completed.
aut_cho	Chooses the best move for the computer.
test_sq	Tests to see if a square has been completed.
square	Fills in a completed square.
score	Scores the points.
fin	Prints game results.
size	Lets you set the size of the board, the one or two player option and the blind or normal game option.
page	Sets up a blank Mode 7 page.
init	Initialises the variables.
board	Draws the screen.

Listing starts on Page 175

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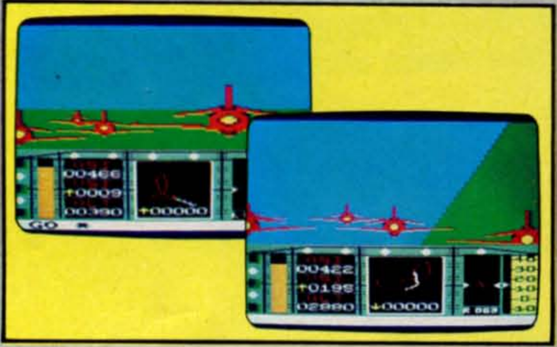

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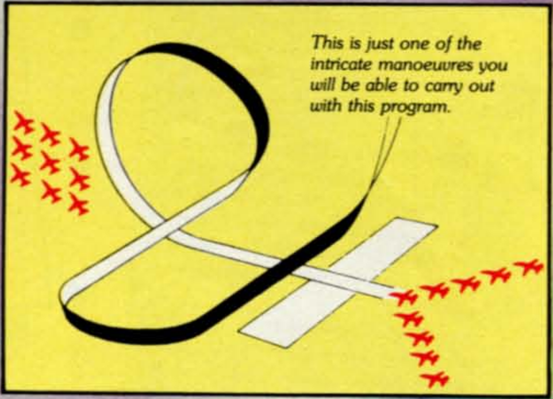

This is just one of the intricate manoeuvres you will be able to carry out with this program.

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The Light Program
Featuring
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In Part Two of his epic, Sub Hunt, ALAN McLACHLAN adds the finishing touches to his strategy game

WE ended last month's session by typing in the procedure to hide 20 submarines in our undersea array. We also added a short line to reveal their "hidden" positions.

If you have done everything correctly so far, when you run the program you should see 20 plus signs indicating the whereabouts of the enemy.

We are now ready to enter the routines which take our input from the keyboard. But we must not forget to remove line 85 otherwise the program won't progress any further.

The first procedure we'll look at is the one to move the boat into the position where we want to drop the depth charge.

Type in Listing I:

```
  720 REM***************************
  730 DEFPROCmove_boat
  740 REPEAT
  750 newboatx=oldboatx+INKEY(-98)-IN
KEY(-67)
  760 IF newboatx>16 newboatx=16
  770 IF newboatx<4 newboatx=4
  780 PROCdelay(.5)
  790 *FX19
  800 PROCwindow(1,oldboatx,10,0,134,
"  ")
  810 PROCwindow(1,newboatx,10,0,134,
boat$)
  820 oldboatx=newboatx
  830 UNTIL INKEY(-74)
  840 ENDPROC
```

Listing I

This and the next three procedures are sandwiched in the REPEAT... UNTIL loop mentioned last month that dictates the length of each game – lines 50,170.

Before we discuss its contents, it is important to understand how the BBC Micro's INKEY – negative number – function works. Although this is briefly explained in the user manual a simple refresher here will do no harm.

Each key on the micro is given its own individual negative number and the operating system continuously interrogates the keyboard to report which keys, if any, are being pressed. The INKEY (–N) function reports the result of this interrogation by returning a value of –1 (TRUE) when the key is pressed.

Line 740 therefore simply states *REPEAT the lines up to line 830 UNTIL the Return (–74) key is pressed.*

Line 750 uses the function inside some fairly complicated, but neat, logic statements in order to move the boat. In simple terms what is happening is this. To the variable *newboatx*, we assign the value of *oldboatx* + the sum of the truth values returned from the INKEY statement. Let's have a closer look at line 750 and see how it works.

The INKEY numbers allocated to the Z and X keys are –98 and –67 respectively. So we use those numbers with INKEY to test whether the key is being pressed, when INKEY returns a value of –1.

To simplify things, let's consider a similar statement using the Z key as an example:

```
oldboatx + INKEY(-98)
```

What's happening? It looks as though we're trying to allocate the value –98 to the ship's last position. Try this:

```
PRINT 1>1
```

If you've typed it in correctly you'll get the response 0. Your micro is stating that it is of the "opinion" that the statement you have just made is FALSE, but since it can't spell, it uses the number 0. 1 isn't greater than 1 is it?

Now try:

```
PRINT 2>1
```

You see the difference? Your micro likes that. The statement is TRUE and the response is also TRUE, or –1 to our illiterate number-cruncher.

So with the above INKEY statement we're actually asking the micro to give an "opinion", based on our input, as to whether the Z key has been pressed. It will respond TRUE (–1) or FALSE (0) depending on whether it was pressed or not.

Of course, we really want to test for both keys at once. No problem, we just use the same trick with the different values, depending on the key responses we're looking for.

That's what we've done in line 750. We make use of those values by adding them together and adding or subtracting the result to or from the last location of the ship to move it backwards or forwards as appropriate.

Lines 760 and 770 make sure that our ship stays within the sea boundary then line 810 prints it at *newboatx* after printing two spaces at *oldboatx*. Finally line 820 assigns the value now in *newboatx* to the variable *oldboatx* before going back to detect another keypress.

If you have typed the procedure in correctly you should now be able to move the boat left or right using the Z and X keys.

Now we're ready for Listing II, the keyboard input routine called at line 110.

This is almost identical to the routine used in Smiley Hunt, the only major difference being the addition of line 920.

Our array element can contain any one of four numbers that register its state at the time it is selected. The meanings of the numbers are as follows:

```
  850 REM****************************
  860 DEFPROCinput
  870 *FX21,0
  880 PROCwindow(1,0,2,4,134,"What de
pth Capt'n ? ")
  890 PROCwindow(1,0,6,4,134,"Choose
A - R: ")
  900 REPEAT:guess=GET AND &DF:UNTILg
uess>=65 AND guess<=82
  910 PROCwindow(1,14,6,4,134,CHR$gue
ss)
  920 IF FNsea(newboatx,guess-65)=2 O
R FNsea(newboatx,guess-65)=3 THEN PRO
Cwindow(1,0,2,0,134,"You've tried the
re !"):PROCdelay(2):PRINTTAB(0,4);SPC
(20):PRINTTAB(0,6);SPC(20):GOTO 880
  930 ENDPROC
```

Listing II

0	Empty
1	Hidden submarine
2	Already selected/empty
3	Already selected/hit

Line 920 tests to see whether a 2 or a 3 is contained in our selected location. If the result is positive, the appropriate message is displayed and the program is sent back immediately to the input line.

This avoids the dropping of an unnecessary depth charge.

Now we can add the dropping routine itself. Type in Listing III.

```
  940 REM**************************
  950 DEFPROCbomb
  960 PROCwindow(1,0,6,4,134,STRING$(
20," "))
  970 PROCwindow(1,0,6,0,134,"Fire ")
:PRINTTAB(6,6);mines+1
  980 PROCdelay(1)
  990 FOR newbomby= 0 TO guess-65
 1000 SOUND &1,-newbomby,200-(newbomb
y*2),2
 1010 IF newbomby AND (FNsea(newboatx
,newbomby-1)=0 OR FNsea(newboatx,newb
omby-1)=1) PROCwindow(2,newboatx,newb
omby-1,0,132," ")
 1020 IF newbomby AND FNsea(newboatx,
newbomby-1)=2 PROCwindow(2,newboatx,n
ewbomby-1,7,132,"X")
 1030 IF newbomby AND FNsea(newboatx,
newbomby-1)=3 PROCwindow(2,newboatx,n
ewbomby-1,0,132,CHR$227)
 1040 PROCwindow(2,newboatx,newbomby,
0,132,CHR$226)
 1050 NEXT newbomby
 1060 SOUND 1,0,0,0
 1070 mines=mines+1
 1080 ENDPROC
```

Listing III

```
 1090 REM**************************
 1100 DEFPROCcheck
 1110 flagx=0:flagy=0
 1120 IF FNsea(newboatx,guess-65)=1 T
HEN PROCbang:ENDPROC ELSE PROCwindow(
2,newboatx,guess-65,7,132,"X")
 1130 FOR locx=4 TO 13:IF FNsea(locx,
guess-65)=1 THEN flagx=1
 1140 NEXT locx
 1150 FOR depth=0 TO 21:IF FNsea(newb
oatx,depth)=1 THEN flagy=1
 1160 NEXT depth
 1170 IF flagx=1 AND flagy=0 THEN PRO
Cwindow(2,0,19,0,132,"Depth OK, move
boat!")
 1180 IF flagy=1 AND flagx=0 THEN PRO
Cwindow(2,0,19,0,132,"Wrong depth !")
 1190 IF flagy=1 AND flagx=1 THEN PRO
Cwindow(2,0,19,0,132,"Depth/location
OK !")
 1200 PROCdelay(3):PROCputsea(newboat
x,guess-65,2):PROCwindow(2,0,0,0,132,
""):PRINTTAB(0,19);SPC(20);:PROCwindo
w(1,0,0,0,134,""):PRINTTAB(0,2);SPC(2
0):PRINTTAB(0,6);SPC(20)
 1210 ENDPROC
```

Listing IV

This routine takes effect immediately you have input the depth for the charge. It was rather more complicated than I first anticipated because of the way the depth charge wiped out everything in its path as it descended.

My original idea was that if you made a wrong guess this was indicated by an X on the screen. Alternatively, a direct hit would be indicated first of all by a graphic explosion, then by a submarine printed on the screen.

This, you will find later, is exactly what happens, but before I found the answer, whatever was on screen was wiped off by the dropping charge.

I overcame the problem as I had previous ones – by shouting "Help!". The solution was to use lines 1010-1030 which test the location that the charge has just left, *newbomby-1*, to see what character was there originally, in order to put that character back again once the charge had gone past.

Under normal circumstances, as the charge drops it is followed by a sea-coloured space to wipe out the original shape. This only happens – line 1010 – when the array element contains either a 0 or a 1.

If the element contains a 2 (line 1020), the space is replaced by the X character, and if a 3 (line 1030), by CHR$(243) the submarine.

You will no doubt find during testing that your plus signs, used to indicate the hidden subs, are wiped out if you drop through any. The trick is not to drop through, but to select the shallowest location in the grid first.

This problem won't arise once we have removed line 695, but for the time being leave it intact.

The next routine DEFPROCcheck, tests for hits and is again almost the same routine we used in Smiley Hunt, as is the one to indicate a direct hit, DEFPROCbang.

Enter Listings IV and V. Line 1120 ensures that if you have a direct hit, DEFPROCbang is called to print the explosion character (244) followed by the submarine (243). It also puts the

→

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```
1510 REM************************
1520 DEFPROCbang
1530 SOUND &10,-10,6,20:PROCwindow(2
,newboatx,guess-65,0,132,CHR$228):PRO
Cdelay(2):PROCwindow(2,newboatx,guess
-65,0,132,CHR$227)
1540 PROCputsea(newboatx,guess-65,3)
:subs=subs+1:PROCwindow(1,0,0,0,134,"
"):PRINTTAB(0,2);SPC(20):PRINTTAB(0,6
);SPC(20)
1550 ENDPROC
```

Listing V

number 3 in the array element and increments the variable *subs*.

If you draw a blank, an X is placed at the selected location, and a series of checks is carried out in order to give clues as to the location of any submarine that may be at a different depth, a different spot, or both.

Listings VI and VII are also virtually identical to the "Finished" and "Results" procedures from Smiley Hunt. Once you have typed these in, the game is complete.

You should now be able to run it and, selecting mostly locations indicated by the plus signs, test that all the routines we've added this month work correctly. Once you're happy that this is so, you can remove line 695.

We have made quite a lot of alterations by putting lines in and pulling them out again. So, just in case you, or indeed I, have left an odd line in or out, the complete program should match Listing VIII.

Now you'll find you have quite an entertaining strategy game that needs quite a lot of thought and planning to avoid wasting a lot of depth charges on locations that couldn't possibly have held submarines.

Anyway that's enough for this month. I hope you've enjoyed getting involved with my program and I'm now planning the next. Wow, it's Christmas already.

Who knows – I may even make a living out of this. See you soon.

```
1220 REM************************
1230 DEFPROCfinished
1240 PROCwindow(1,0,0,0,134,CHR$12)
1250 IF mines>19 PROCwindow(1,0,2,0,
134,"You're out of ammo!")
1260 IF subs>4 PROCwindow(1,0,2,0,13
4,"That's the lot!")
1270 PROCdelay(3)
1280 ENDPROC
```

Listing VI

```
1290 REM************************
1300 DEFPROCresults
1310 PROCwindow(1,0,0,0,132,CHR$12)
1320 PRINTTAB(0,4);"That took ";mine
s;" mines"
1330 PROCwindow(2,0,0,0,128,CHR$12)
1340 COLOUR 3:PRINTTAB(0,11);"And yo
u had "subs" subs"
1350 PROCwindow(2,0,15,3,128,"Try ag
ain Y/N")
1360 REPEAT A=GET AND &DF:UNTIL A=89
 OR A=78
1370 IF A<>89 THEN END
1380 ENDPROC
```

Listing VII

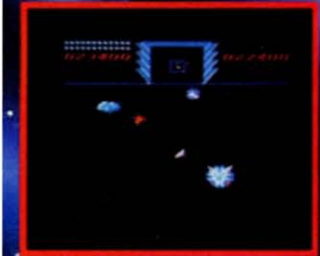
> **‘It's an entertaining strategy game needing a lot of thought and planning’**

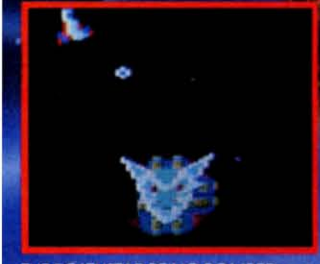
```
  10 REM Sub hunt
  20 MODE2
  30 PROCtitle
  40 PROCinit
  50 REPEAT
  60 PROCstartup
  70 PROCscene
  80 PROCsubs
  90 REPEAT
 100 PROCmove_boat
 110 PROCinput
 120 PROCbomb
 130 PROCcheck
 140 UNTIL subs>4 OR mines>29
 150 PROCfinished
 160 PROCresults
 170 UNTIL FALSE
 180 REM************************
 190 DEFPROCtitle
 200 VDU23;8202;0;0;0;
 210 CLS
 220 COLOUR1:FOR x=2 TO 16:PRINTTAB(
x,8);"+"
 230 NEXT x
 240 FOR x=2 TO 16:PRINTTAB(x,21);"+
"

 250 NEXT x
 260 COLOUR 3:PRINTTAB(8,12);"Al's"
 270 A$="Sub Hunt"
 280 FOR x= 1 TO LEN(A$)
 290 B$=MID$(A$,x,1):COLOUR RND(3):P
RINTTAB(2*x,16);B$:READ pitch:SOUND 1
,-15,pitch,10
 300 PROCdelay(.7)
 310 NEXT x
 320 PROCdelay(3):CLS
 330 ENDPROC
 340 REM************************
 350 DEFPROCinit
 360 DIM sea 19*21
 370 VDU23;8202;0;0;0;
 380 VDU23,224,0,0,0,0,0,7,255,127
 390 VDU23,225,0,0,0,0,208,240,255,2
52
 400 VDU23,226,0,0,0,24,24,0,0,0
 410 VDU23,227,0,0,16,24,126,255,126
,0
 420 VDU23,228,17,128,4,88,8,34,40,1
32
 430 boat$=CHR$(224)+CHR$(225)
 440 ENDPROC
 450 REM************************
 460 DEFPROCstartup
 470 mines=0:subs=0
 480 oldboatx=10
 490 ENDPROC
```

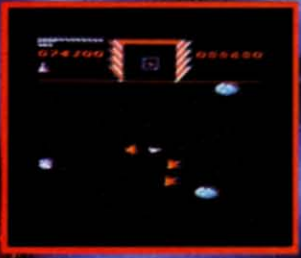
Turn to Page 168

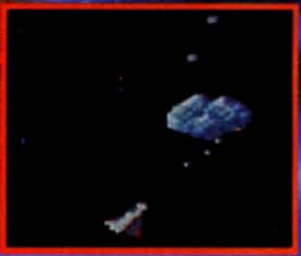
A SPECTACULAR ARCADE-STYLE GAME

DeathStar


THE FIRST ZONE.


THE DEATHSTAR BEING BOMBED.


THE WARRIOR ZONE.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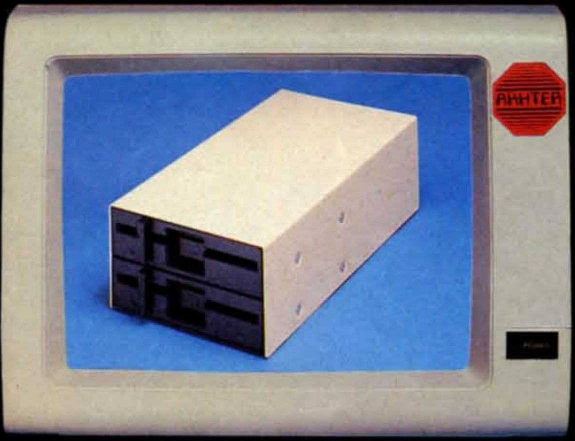

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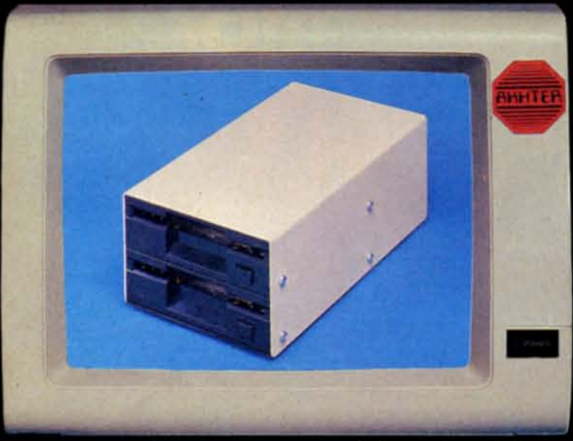

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Acornsoft 6502 Development Package:

Well worth the wait

By KEVIN EDWARDS

AT last the Acornsoft 6502 Development Package, for use with the 6502 second processor, has arrived – and it's been well worth waiting for!

It consists of a user guide, a function key strip, a reference card and a 40 track disc. An 80 track version of the programs can be created using a conversion utility supplied on the disc. The rest of the disc contains nine programs related to the development package, as shown in Table I.

The first thing I noticed while glancing through the excellent 130 page manual was the new mnemonics used by the assembler, MASM. Instead of using the standard BBC Basic CMOS technology mnemonics, MASM requires, as far as I can tell, Rockwell 6502 mnemonics. So, for example, instead of using LDA#4 you would enter LDAIM 4, where IM indicates the addressing mode – IMmediate in this case.

These new mnemonics have been used instead of the standard ones to increase the speed of the assembler. And it certainly works because MASM is very fast.

The reference card, and manual, list the BBC Basic mnemonics and addressing modes along with the MASM equivalents to help those of us with poor memories.

In addition to the standard 6502 instruction set MASM can assemble the new CMOS instructions available on 65C02 processors – as in the second processor itself. This is also useful if software is being developed for a normal BBC Micro which has had its standard 6502 replaced with a 65C02. Here's a few of the 'new' 65C02 instructions for anyone who missed Peter Johnson's second processor articles in the September 1984 issue of *The Micro User:* PHX, PHY, TRB and TSB.

The first step taken when writing a program is to create a source file containing the instructions which are to be assembled by MASM. This is done with EDIT – a very powerful text processor which contains all the usual features found in word processors. These include block copy, move and delete and a very powerful string search and replace.

The key strip supplied with the package is solely for use with EDIT and shows the features provided by the function keys. Pressing f0, for instance, allows the cursor to be moved to a specific line. This is very important when de-bugging source files as the lines containing errors are reported when the file is assembled.

The complexity of EDIT is such that the whole review could be dedicated to it alone. The only difference between EDIT and standard wordprocessors is the lack of justification, printer options and a programming language (as in the case of Wordwise Plus). But who needs these with a source file editor? And anyone who's ever used ISO-Pascal will know how enjoyable the Acorn editors are.

EDIT	A text editor.
IOMASM	IO processor code for MASM.
MASM	A macro assembler.
SRCXREF	A free standing cross referencer.
XREF	A masm dependent cross referencer.
BTRACE	A trace package for the stand-alone BBC Micro.
TTRACE	A trace package for the second processor.
PR	A print utility for the stand-alone BBC Micro.
PRINT	A print utility for the second processor.

Table I: The nine programs in the system

Source files created with EDIT can be printed out using one of two print utilities. If a second processor is not at hand the program PR is used. An identical second processor version, PRINT, is also included.

Both programs allow up to nine print options to be altered. These include the page width, length and heading. Provision has also been made to send the output to the econet printer.

Now we come to the heart of the development system: MASM, a two pass, disc-to-disc macro assembler, is used to assemble the source files created with EDIT.

Each line of the source consists of four fields. These are:

```
label  opcode  operand  ;comment
```

The first field is used to declare a symbol or label. However, for speed each symbol is limited to six characters in length. The next field can contain either an opcode or a directive – more about directives later. The operand field contains the remainder of the instruction or additional parameters for the directive. The last field allows a general comment to be added to the line. This can in fact be in any field as long as the previous fields are valid.

MASM accepts various directives which increase the flexibility of the assembler. In addition to the standard define byte, word and string (BBC assembler's EQUB, EQUW and EQUS) you can define and call macros, perform conditional and repetitive assembly, reserve space and much more.

The most important feature must be

→

From Page 129

MASM's macros. These have been extremely well implemented.

For those of you who don't know, macros are statements that expand a set of parameters into a piece of code. Each time the assembler encounters the macro it automatically enters the relevant code into the file being created, saving you having to repeat similar lines of coding. Unlike a subroutine, which is held at one place in memory and called when necessary, the section of code is written out in full each time the macro is invoked.

MASM also allows you to define and set global and local variables. Normally, symbols have fixed values – except macro parameters – but if a global or local variable is defined it can be altered during the actual assembly, in a similar way as Basic's LET. Three types of variables can be defined – arithmetic, logical and string. Therefore, using arithmetic variables, loop structures can be created which repeatedly assemble calculated data into memory. This is useful when large base conversion tables are required, for example.

Another of MASM's directives is LNK – short for link. This permits a large program to be split into several source files. The next file to be assembled is indicated by the string following LNK. MASM will then load the new source file into memory and continue assembling from the point it was at previously. This continues until the END directive is located, at which point MASM commences with the next pass or ends if it's the second pass. This means that very large programs can be developed. In fact, you're only limited by the second processor's memory which contains the labels.

MASM has its own command mode from which options are selected. The first, and most important, is ASM *filename*. This informs MASM that you wish to assemble the source file specified.

After selecting the source file a Macro Library is requested. This allows an external set of macros, held in another file, to be included in the next assembly.

Once all the source and macro library filenames have been requested the two pass assembly begins. If any errors occur the line number and source file of the offending statement are printed on the screen. If Ctrl+B is pressed during the command mode, any errors are also echoed to the printer. When, and if, assembly errors occur EDIT must be used to correct them.

One of MASM's commands, PRINT, allows a listing to be enabled or disabled during the second pass. If PRINT is enabled a full listing of the program is produced on the screen or printer. The width and number of lines per page can also be specified. This is achieved using the appropriately named commands WIDTH and LENGTH.

Once a file has been assembled the object code is saved in the X directory using the source filename previously entered. In addition to this the second processor's memory contains the symbol table. This consists of the variables and their values for the last program assembled.

These can be examined using the command SYMBOL. Both selective and alphabetical lists can be produced of the symbols present. Any which have been declared but unused are also marked with an asterisk. These lists are essential when de-bugging programs.

Another important MASM command is XREF. If this is selected a cross-reference file will be created during assembly. This is required by XREF, a MASM – dependant cross referencer. More about XREF later.

The remaining MASM commands are extra luxuries, one of which will print the source code ignored by conditional assembly – what more can you want? Summarising MASM's facilities is rather like writing the new testament on a postage stamp. All I can say is its scope staggers me.

During the development of any program there comes a time when all is not as it should be. And when this happens the offending 'bug' must be located and removed. The development system has four utilities to help with this.

The first two allow source files to be cross referenced, whereas the other two are trace routines which allow the object code to be emulated. I'll leave the trace routines until later.

The first cross referencer, XREF, makes use of the XREF file created by MASM. Before XREF can be used, a list of the symbols you are interested in must be entered. These symbols are the ones that will be cross referenced with the MASM XREF file.

XREF has its own command mode from which various options are selected. Table II gives a brief description of each one.

ADD	Adds a new symbol to the symbol table.
CLEAR	Removes a particular symbol from the table.
HELP	Lists XREF's commands.
INIT	Erases the symbol table.
LIST	Lists the symbols in the table.
RESULT	Produces the result after cross referencing, indicating the line numbers where each symbol is used.
SUMMARY	Allows the summary produced by the XREF command to be enabled or disabled.
XREF	Cross references the symbols in memory with a specific MASM XREF file.

Table II: XREF's commands

Creating the symbol table is made very easy by the flexible commands provided. The RESULT phase is very useful because in addition to printing the line number and source file of the 'matched' symbols, it points out any symbols which weren't found in the XREF file along with any symbols defined in the source but unused.

The second cross referencer, SRCXREF, is free standing and therefore doesn't require a MASM XREF file to operate. This means that a set of 'raw' source files can be cross referenced without assembling them.

The command mode SRCXREF is almost identical to XREF's minus the SUMMARY command. SRCXREF's XREF option requests the name of the source file which is to be cross referenced. This file is now 'scanned' as

> A macro is a statement which expands a set of parameters into a piece of code

if it were being assembled until an END directive is found.

Therefore if any LNK directives are found the corresponding source file will be loaded and the cross reference will continue from the start of the new source – clever isn't it?

The cross referencers are very flexible and easy to use – full marks must be awarded. It's hard to imagine anyone developing a decent software package without such useful tools.

The second pair of debugging utilities allow the object code produced by MASM to be emulated/traced. TTRACE resides at the end of the second processor's memory in locations &E600 and &F7FF.

As with the rest of the package it has its own command mode from which the options are chosen. There are a large number of trace commands, 27 in total, which all consist of two letter mnemonics – fortunately all printed on the quick reference card. Some of these require additional parameters.

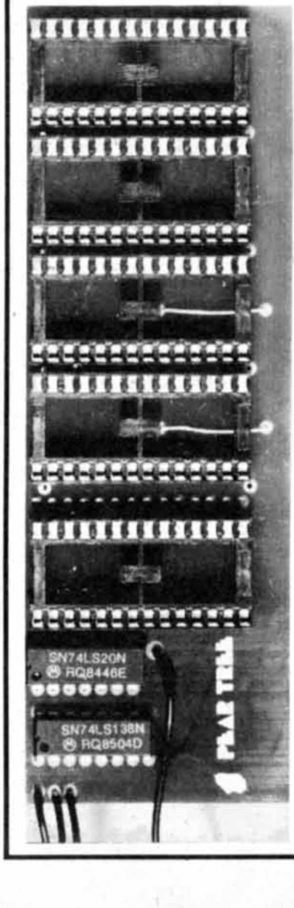
As you'd expect TTRACE allows breakpoints to be set, cleared and listed. Other features include an interrupt key, a disassembler and a memory dumper.

There are two tracing modes – continuous and snapshot. The first traces a program until a breakpoint is reached or an interrupt occurs. During the trace a copy of the 6502 registers and flags is displayed on the screen. If the snapshot trace is selected only the next instruction is executed.

Another trace routine, BTRACE, is also supplied with the development system. This is designed for the stand-alone BBC Micro and sits in memory between &6A00 and &7BFF – therefore Mode 7 only.

Unfortunately the trace utilities are rather poor in comparison with the rest of the package. I was very surprised to see that TTRACE didn't recognise 65C02 instructions.

To summarise, the 6502 development system is an absolute must for any serious programmer with a second processor. The only weak part of the package is the trace section. This, however, can be simply replaced with a decent machine code monitor. So if you're after a good development system and are prepared to put up with the unusual mnemonics take a very close look at Acornsoft's excellent offering.



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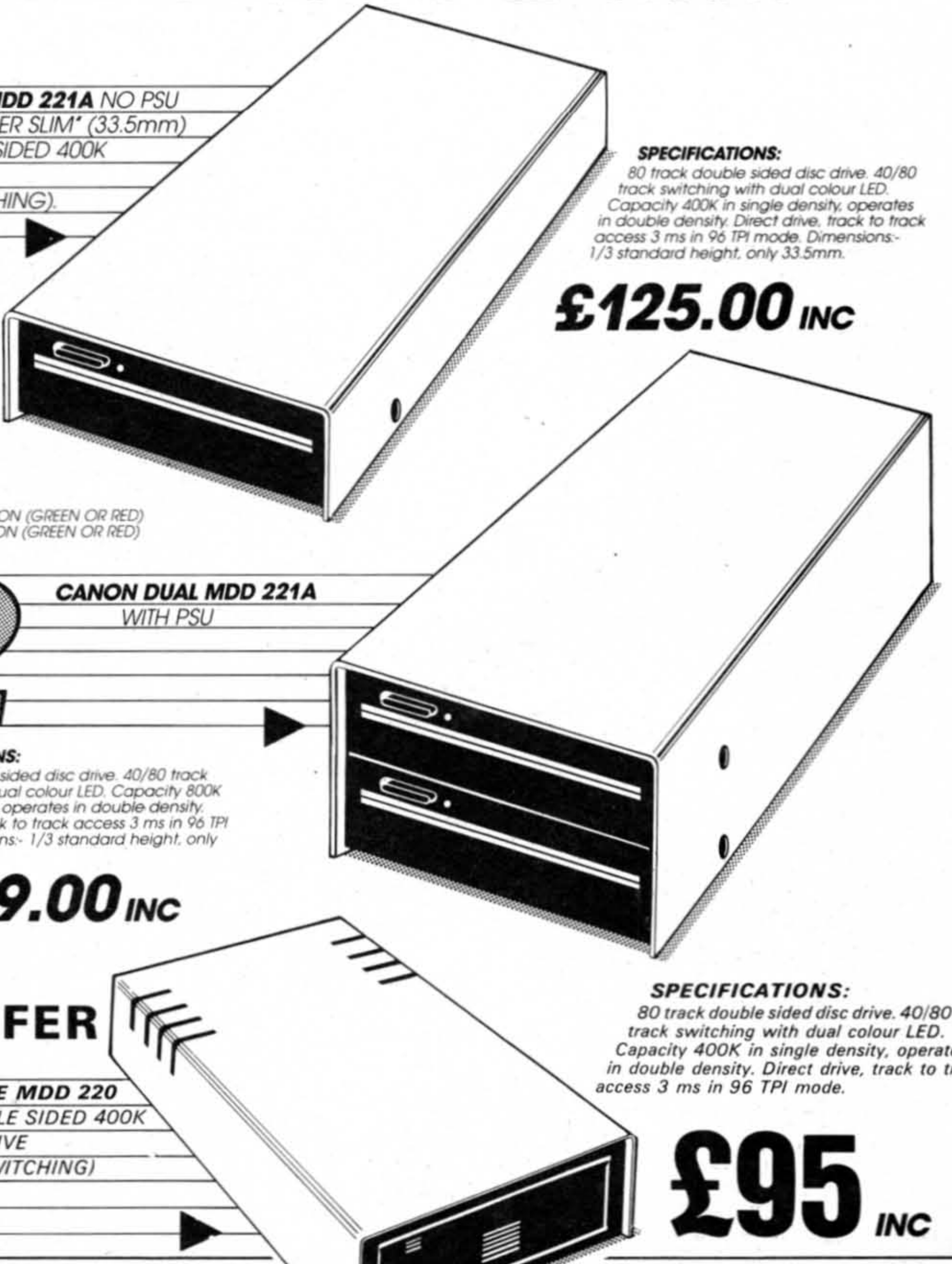

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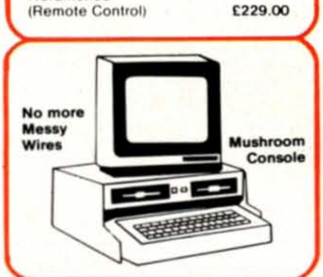

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BBC FIRMWARE

FIRMWARE

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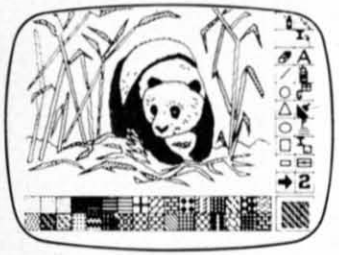

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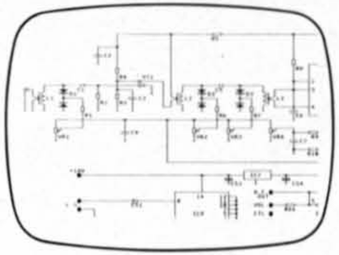

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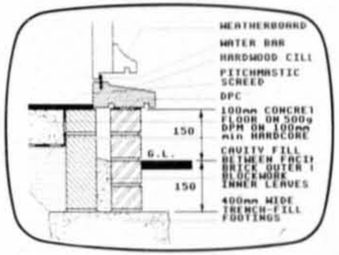
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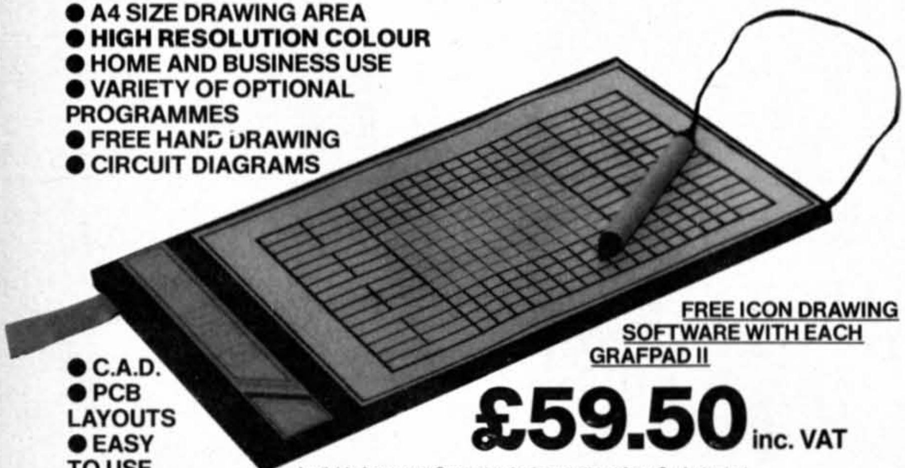

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SPECIFICATION

Resolution:
1280 x 1024 pixels

Repeatability:
1 pixel

Output rate:
2000 co-ordinate pairs per sec.

Interface:
parallel

Origin:
LH corner or selectable

Dimensions:
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A range of software specifically designed to enhance and extend the use of Sideways RAM on ATPL Sidewise and other products.

★ **SPOOLIT** Allows the Sideways RAM to be used as a 8K or 16K printer buffer.

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★ INDEX UTILITY ROM

Index Utility has been written to help utilize the ATPL SIDEWISE board to its fullest extent.

Features supported include:

- Paged ROM/RAM control.
- Memory eraser.
- Disc utilities.
  plus many more, including features to make the use of a 6502 Second Processor less tiresome.

Command examples are:

- Disc free space per drive.
- Dump text window to printer.
- Erase; Memory in specified area, ROM control switch and tube memory.
- Display low memory areas.
- Load menu.
- Switch NFS off.
- Manipulate read/write on ROM 15.
- ROM display.
- ROM switch on/off copy.
- Search facilities.

As can be seen from just a few of the many commands this ROM is a useful addition to the SIDEWISE ROM board.

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INSIDEOUT is designed to make a sideways ROM socket available outside the BBC computer, to allow for easy exchange of sideways ROM's.

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Demonstrations of Symphony can now be seen at the following places.

Technomatic, 15-17 Burnley Road, London NW10 1ED.
Electronequip, 59 West Street, Fareham, Hampshire CO16 0JW.
The Data Store, Chatterton Road, Bromley, Kent.
Cardiff Micro, 46 Charles Street, Cardiff CF1 1EE.

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- Screen printer dumps to Epson printer.
- Utilities to provide users with light pen routines.
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- Please state 40 or 80 track disc.

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INTEGRATION—THE FACTS

INTER-SHEET and INTER-CHART are the first of a new generation of integrated packages for the BBC Micro. They are more powerful and much easier to use than any other similar application program.

The ROM-LINK concept is unique to this range of programs; it ensures that all ROM-LINK programs are totally compatible and truly integrated.

The word 'integrated' has been much abused recently. In our eyes 'integrated' should mean that all programs in the range should share a common data format, that it should be possible to transfer data directly from one program to another (not just by saving and loading) and it should be possible to have multiple programs resident in the machine at once. The integrated programs in the ROM-LINK series are the only ones that can do this.

The ROM-LINK system allows up to 16 packages to be resident in memory at the same time. It makes no distinction between any of the packages, so that you could have up to 16 separate spreadsheets stored in memory or (more usefully) a few spreadsheets, a few graphs and a couple of documents being word processed. It is a simple matter to transfer data from any package into the one in current use, and because the packages are resident in memory, the data transfer is very fast. It is also possible to use data from other packages without actually transferring, thereby saving memory.

Put simply, this means that INTER-SHEET can use multiple spreadsheets and use data from one sheet in another sheet, and INTER-CHART can plot graphs using data taken directly from a spreadsheet. When INTER-WORD and INTER-BASE are available then these will be able to use data from the other packages in the same way.

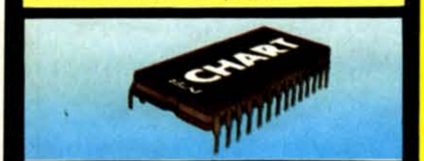
FACTS

INTER-CHART

The chart and graph plotting program

This general purpose graph and chart plotting program allows the user to display data in the most easily understood manner—graphically.

Two quite distinct sorts of graphs are catered for. 'Labelled' graphs that always have fixed increments on the X axis like yearly sales figures, and 'scaled' or scatter graphs. These allow both the X and Y values to be specified.



Data can be entered into the system from three distinct sources: Typing at the keyboard is the simplest method, but data can be read from ASCII files produced by WORDWISE, VIEW or a programming language such as BASIC. Because INTER-CHART is ROM-LINK compatible it can also import its data directly from other ROM-LINK packages such as INTER-SHEET.

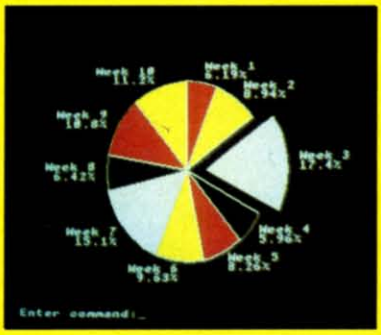
Once the data has been entered a straightforward editor allows any previous data to be altered or new values to be inserted at any position.

TEXT WITH GRAPHS: Labels are normally printed along the X-axis for lines and bars. Pie charts have their labels and values printed around the chart. These may be optionally switched off. With a pie chart the values may be replaced with a percentage figure. All graph displays can have additional labels or messages printed at any position on the screen using a powerful label editor. This allows headings to be easily added to graphs. These labels are stored with each graph when saved.

COMPATIBLE WITH: All shadow RAM boards and the 6502 2nd processor. However the ROM-LINK facilities are not available when using a 2nd proc., these include multiple INTER-CHARTS and direct data transfer from other ROM-LINK programs.

PRICE: £36.80 incl.

INTER-CHART allows up to 16 graphs to be held in memory at the same time as one 'package'. Each graph is named and, once entered, any named graph can be selected from a simple menu display.



```
Enter command:_
```

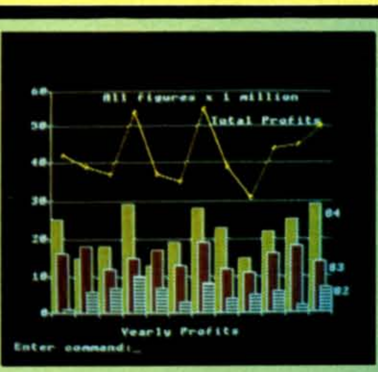
SCREEN DISPLAY: The graphs can be displayed in any of the BBC's graphics modes. The colours of the bars, lines or segments can be altered in a simple table of colours. This also allows special striped colour combinations and for bar charts a variety of cross hatching styles is available. It is also possible to use a VDU19 statement to alter the colour palette.

DISPLAY OPTIONS: Where appropriate (not pies, etc) either axis can be displayed as a log or linear scale, and there is an option to display dotted graduation lines on either axis. Pie segments and bars can be highlighted (segment 'pulled out').

PRINTERS: INTER-CHART has a built in screen dump routine for all EPSON matrix printers and compatibles. It is possible to use other screen dump routines from within (or external to) INTER-CHART for other printers or plotters.

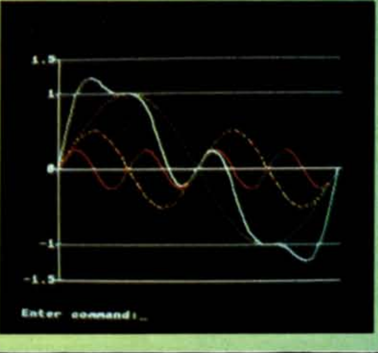
FILING OPERATIONS: Any named graph can be saved or loaded individually to disc or cassette, or all graphs can be saved together in one file.

GRAPH TYPES: INTER-CHART supports the three main graph types, lines, bar charts and pie charts. Scatter graphs are also catered for and can be displayed as points or lines.



```
Enter command:_
```

SCALING: INTER-CHART automatically scales the graph display to cover the full range of values entered. INTER-CHART can cope with numbers in the range 2E-39 to 2E+38. It is possible however to force the scale independently on the X and Y axis to show any specified range, including the option for log scales on either or both axes.



```
Enter command:_
```

FUTURE RELEASES

Both INTER-SHEET and INTER-CHART are available now. INTER-BASE and INTER-WORD are under development at the moment, and are likely to be released in early 1986. Both are fully ROM-LINK compatible so that they will be totally integrated with the others in the range.

INTER-WORD is an 80 and 105 column word processor (not 40 columns). This will be a 'WYSIWYG' word processor showing the page on screen exactly as it would appear on the page, including page breaks, headings/footings and centered lines, justification, margins, etc. It will also handle 'continuous' documents on disc up to the capacity of your filing system.

Like all of our products this will be smooth and very fast in operation, and of course very easy to use. Editing operations will be similar to WORDWISE but this is not totally WORDWISE compatible. There will be an exchange arrangement available to WORDWISE owners—more details available nearer the release date.

AVAILABILITY: Winter 85/86
PRICE: Approx. £49.00 + VAT

INTER-BASE will simply be the most powerful database available. This will operate with all disc filing systems and have a very large data handling capacity. It will contain a powerful BASIC-like programming language with full string and mathematical operations.

This will work at 2 levels, a simple user interface will allow card-index like operations but, via the programming language, the system can be easily tailored to the individual needs. Up to 250 fields per record, each field up to 32K long. This would enable the user to store complete documents in the database. Variable length fields and records.

AVAILABILITY: Early 1986
PRICE: Approx. £59.00 + VAT

INTER-SHEET

The electronic spreadsheet program

FACTS

INTER-SHEET and the rest of the ROM-LINK series belong to the 2nd generation of application programs for the BBC Micro. They are larger, more powerful and easier to use than any previous products of this sort.

ROM-LINK

INTER-SHEET offers many quite unique features.

1 The fastest spreadsheet—see comparison box

2 The largest capacity—see comparison box

3 40, 80 and special 105 column screen mode

4 Multiple spreadsheets in memory at once

5 Data transfer between sheets in memory

6 Data transfer to and from word processors such as WORDWISE and VIEW

7 Menu operation and fully prompting commands

8 Complete documentation. 2 manuals, an introduction and a reference, are supplied along with a quick reference card.

9 Will integrate directly with INTER-CHART and other ROM LINK compatible products.

FILING OPERATIONS: Load and Save entire sheet. Save specified part of sheet. Load part of sheet to any sheet position. Spool sheet to file. Save all ROM-LINK packages. Load all ROM-LINK packages.

IMPORT/EXPORT: Export any part of sheet for use in word processors. Import sheets created on word processors. Import data directly from other ROM-LINK packages.

PRINTING: Print all or specified part of worksheet. Print with or without sheet borders. Print with or without held lines (windowing). Sheets titles can be printed and control codes can be sent to the printer. Print all formulae. The pound sign code can be altered to a sequence of codes for different printers.

AUTO-STEP: Whenever an entry has been made the cursor can automatically move one box up, down, right or left.

CELL DISPLAY: Any box (cell) can be displayed left or right justified. Labels can also be centered. Numbers may be displayed in three formats, exponent, fixed or general format. The number of digits is controllable from 0 to 10.

LOCKING: Any box, row or column or all boxes can be locked to prevent accidental alteration.

LABELS: Formulae can refer to other boxes in the normal way (e.g. A1 or G5) but can also refer to boxes in a much more meaningful way via labels (e.g. JAN SALES), the box referred to is at the intersection of the column and row of the specified labels. Labels are not restricted to being placed on the borders of the sheet only.

REPLICATION: Any box or area can be copied to any other box or area on the sheet, giving total flexibility. The replication is very fast—see comparisons. Single key operations for inserting or deleting a row or column. Formulae can automatically be altered, if desired, relative to their new position.

OPTIONS: A variety of spreadsheet defaults can be altered, such as the default box justification, number format, sheet area. Screen colours are easily alterable.

WINDOWING: A unique system that allows any row or column (or multiple rows and columns) of the sheet to appear at a fixed position on screen, still allowing the sheet to scroll underneath. Far easier to use and more flexible than other windowing systems.

The first published review of INTER-SHEET says:

"... It offers higher capacities than any previous Beeb spreadsheet, but it runs significantly faster than Lotus 1-2-3 and Symphony on the IBM-PC,"

"INTER-SHEET is quicker, has more features and is cheaper than either of its competitors. If the remainder of the "Inter-" series are as good as this Acornsoft and the rest better look to their laurels. Software of such quality can only make the Beeb even more attractive as a business machine."

Gordon Taylor—A&B Computing Sept. 85

PRESS

COMPATIBLE WITH: Shadow RAM boards such as the Aries B20 and Watford electronics 32K RAM board. Because the ROM-LINK system needs to switch ROMs INTER-SHEET is not compatible with the 2nd processor, although a HI version of INTER-SHEET will be available for the 6502 2nd processor (No ROM-LINK facilities and no 105 screen mode). INTER-SHEET is supplied in 2 ROMs, but if you only have 1 socket then only the ROM-LINK facilities are lost (multiple spreadsheets etc).

For the BBC MICRO
Available from all good software dealers or directly from ourselves

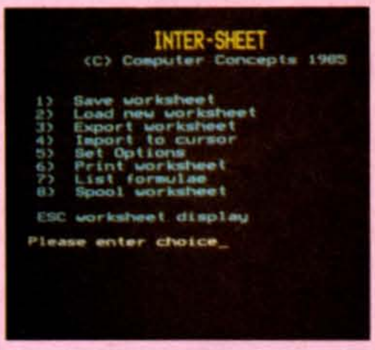
Some further facts about INTER-SHEET:

CURSOR MOVEMENT: WORDWISE-like cursor movement allowing the user to move left or right one box, one screenful or to the extremes of the used sheet area. A further command allows immediate movement to any specified box.

SCREEN DISPLAY: Single key switch for 40, 80 and a special 105 column screen mode. This allows much more of the spreadsheet to be visible on screen at once. The 105 column mode requires no special monitors—if you can read the 80 column mode then the 105 will work perfectly well.

SHEET SIZE: 64 columns by 255 rows. Each box can hold up to 80 characters. Column widths are variable up to 31 characters wide. There is no gap between boxes so labels can continue across boxes.

MATHS: A full range of maths functions is included. There are also additional special spreadsheet functions such as AVERAGE, COUNT, IF..., LOOKUP, MAX, MIN, SUM, BOX and SQRS (sum of the squares). Numbers can range from 2E-39 to 2E+38 and can be printed to 10 significant figures.



```
INTER-SHEET
(C) Computer Concepts 1985

1)  Save worksheet
2)  Load new worksheet
3)  Export worksheet
4)  Import to cursor
5)  Set Options
6)  Print worksheet
7)  List formulae
8)  Spool worksheet

ESC worksheet display

Please enter choice_
```

ROM BASED SOFTWARE FOR THE BBC MICRO

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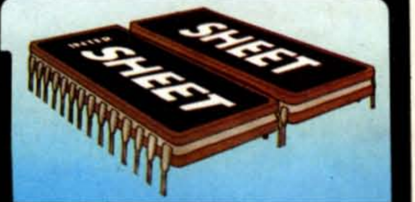

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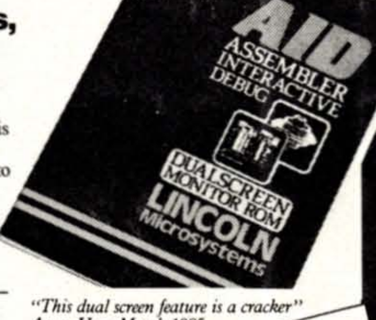

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SINGLES or DOUBLES?

The 1770 board gives you both

JIM NOTMAN takes a look at two new disc filing systems for the BBC Micro

ONCE it was relatively easy to know all about the Acorn DFS, for there was only one, the 0.90 version. However, since then a number of different versions have been released, some official, many unofficial.

Judging by the questions asked at the Technical Advice Stand at recent Micro User Shows, this has lead to a great deal of confusion, so let's sort it out . . .

The next "official" DFS to appear was the 1.20. This is much faster than the 0.90 and is combined with Econet and Tube driving software in the DNFS.

Both of these earlier DFSs were designed for the older BBC A and B which have a disc interface that uses the Intel 8271 floppy disc controller.

This was probably the biggest design fault of the BBC Micro. This chip only supports single density working, is expensive and in short supply. It is doubtful that any more will be produced. (Military versions of the chip may be around for a little longer but they are even more expensive.)

Acorn has already had experience of another controller, the Western Digital 1770, which is in the Electron Plus 3 add-on disc unit.

This is the controller chip that comes as standard on the BBC B+. Despite its ability to support double density, in a bid to remain compatible with the earlier 8271 DFSs, Acorn has produced a 1770 DFS which only works in the single density mode.

Even this newer DFS has undergone changes. The first 1770 DFS we saw, the 2.0j, was in a 64k model B+ just after its announcement. It didn't last long.

It now seems to have been replaced

*HELP DFS	
DFS 2.20	
ACCESS	<afsp>(L)
BACKUP	<source><dest.>
CLOSE	
COMPACT	(<drive>)
COPY	<source><dest.><afsp>
DELETE	<fsp>
DESTROY	<afsp>
DIR	(<dir>)
DRIVE	<drive>(40)(80)
ENABLE	
EX	(<dir>)
FORM	40/80(<drive>) . . .
FREE	(<drive>)
INFO	<afsp>
LIB	(<dir>)
MAP	(<drive>)
RENAME	<old fsp><new fsp>
TITLE	<title>
VERIFY	(<drive>) . . .
WIPE	<afsp>
*HELP UTILS	
BUILD	<fsp>
DISC	
DUMP	<fsp>
LIST	<fsp>
ROMS	(<rom>)
TYPE	<fsp>

Table I: DFS 2.20 commands

*CLOSE	Closes any open files (CLOSE#0 in Basic).
*DRIVE	This command has been extended so that a 40 track disc can now be read by an 80 track drive.
*EX	Similar to *INFO, but gives information about all the files in a directory.
*FORM	Built-in formatter for 40 or 80 tracks. Up to four drives can be included in the statement. For example *FORM80 0 2 1 3 will format both sides of discs in drives 0 and 1.
*FREE	Displays the total amount of used and free space and file names on a disc.
*MAP	Prints the areas of disc that are free for use. If there are many entries it shows that a *COMPACT is required.
*ROMS	Lists the roms in the machine and whether they have language and/or service entry points.
*VERIFY	Checks that a disc can be read. Like *FORM, more than one drive can be specified at a time.

Table II: The new 1770 commands

From Page 141

by version 2.20 which contains extra software. While this does not have double density working it does come on a 16k eprom, allowing space for more code.

Table I gives the commands listed by *HELP DFS and *HELP UTILS. The new commands given by the 1770 DFS are shown in Table II.

The latest version, DFS 2.20, now includes Tube software (Tube Host 2.20) as well as extra sideways RAM commands specially for the 128k B+.

Those of you wanting to upgrade from an 8271 to a 1770 – if that's the right word – will be glad to know that the 1770 interface is now available as an add-on kit for the model B.

The main components are mounted on a small, neat, printed circuit board only 47mm by 57mm. It plugs straight into the socket normally occupied by an 8271.

There doesn't seem to be much room between the new board and the main BBC board if a speech processor is present. Possibly an extra IC socket may need to be inserted between them to give an adequate clearance.

The ease of fitting depends mainly whether IC86 is mounted in a socket. If it is there's no problem, simply plug in a link.

Otherwise, unless you're very handy with a soldering iron, it's best to get a dealer to do the conversion as you have to remove the IC.

The kit includes the 2.20 DFS, the main benefit of which is the ability to throw away your disc with *FORM on it

Any problems encountered while using the 1770 DFS are likely to be due to the way various software writers have tried to protect their discs from being copied.

Up until now many methods have relied on writing directly to the 8271. Now the 1770 based disc interfaces are available the protection systems will need to be altered so that they can cope with both controllers. Alternatively, different versions will be needed for each controller.

The 2.20 DFS can mimic the 8271 to a certain degree so that much, but not all, of the present software can be run. One point that causes problems is that the B+ responds slightly differently to INKEY–256, but after pressing Ctrl + Z + Break it responds like an ordinary BBC B.

ADFS – slow but sure to please

WHILE the 1770 board was in place I took the opportunity of looking at Acorn's ADFS (Advanced Disc Filing System). The same software drives both the double density floppy disc system as well as Winchester hard discs.

If you were annoyed with PAGE being increased to &1900 with the ordinary DFS, you'll be furious with PAGE going up to &1D00 with the ADFS.

If both DFS and ADFS have reserved space at the same time PAGE is further increased to &1F00. The software is easy to disable by putting 255 into location (&DF0 + socket number) then pressing Break. The ROM will then remain disabled even through a Ctrl+Break.

Balancing the loss of RAM there is much more room for data storage on disc, as the ADFS is a double density-only system.

The name double density is a little misleading because you don't get twice as much information on a disc as the name suggests, but there is still a worthwhile improvement as you'll see from Table III.

While some manufacturers have put 18 sectors on a disc track, Acorn only put 16. They maintain that this will give greater reliability with the large number of different disc drives available today.

Unfortunately a utility disc was not included with the review copy, which would have been a problem if the ADT (Advanced Disc Toolkit) from Advanced Computer Products had not been available to format discs (as well as providing other useful functions).

The most striking feature of the ADFS is its hierarchical directory structure. A directory may contain other directories. If used carefully this can greatly aid the organisation of files on a disc.

The first one on the disc is referred to

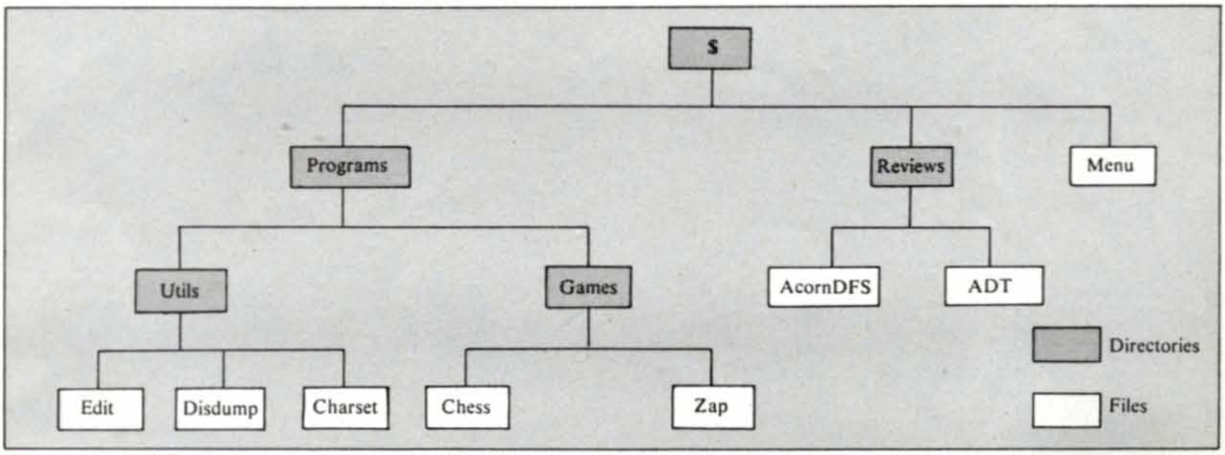

Figure I: A typical directory tree

as the root directory. In the example shown in Figure I it contains three files. Only one – MENU – is a program. The other two are other directories, indicated by the D after their names. (The meanings of the other letters are given under *ACCESS in the list of ADFS commands.)

If you catalogue the disc you'll see:

```
Work Disc                 (13)
Drive:0                   Option 00 (Off)
Dir. $                    Lib. $

MENU        WR  (03)      PROGRAMS DLR (01)
REVIEWS     DLR(02)
```

To select REVIEWS as the current directory simply type in *DIR REVIEWS. Its contents can then be listed with *CAT, as shown here:

```
Software reviews          (03)
Drive:0                   Option 00 (Off)
Dir. REVIEWS              Lib. $

AcornDFS  WR (02)         ADT        WR (01)
```

If you are in the root directory and want to load the program EDIT, you will need to tell the ADFS where to find it either by going through each directory in turn with *DIR to get to the directory it is in or by giving it a full "path name" specifying which directories it must follow, as in LOAD "PROGRAMS. UTILS.EDIT".

Each directory can hold up to 47 entries. It would be possible to follow a very long path going through up to 127 layers of directories. For practical purposes it's difficult remembering more than four or five at one go.

The longer file names – up to 10 characters – allow for more meaningful names, even if it does mean more typing.

At last you don't need to remember which side of a disc your file is on. Double sided discs are now treated as if they had one long side, allowing for longer files.

One of the most annoying features of the DFS – the "Can't extend" error – has to a large extent been banished. The ADFS keeps a map so that it is aware of any free space available on a disc.

The ADFS will not respond to any OSWORD calls directed at the DFS. It has its own separate set of calls which use a parameter block like the DFS as

	DFS	ADFS
40 track single sided	100k	160k
80 track single sided	200k	320k
80 track double sided	400k	640k
Twin 80 track double sided	800k	1280k

Table III: Formatted disc capacity

*ACCESS	Now has extra attributes: L still locks a file against deletion and overwriting. E only allows a file to be executed, not loaded. R allows a file to be read. W allows a file to be written to.
*BACK	Go back to the previously-selected directory.
*BYE	Closes all files and updates the disc if necessary.
*CDIR	Creates a new directory.
*CLOSE	Closes all files. Equivalent to CLOSE# 0 in Basic.
*COMPACT	As with the DFS, it will gather the free space on a disc into larger continuous areas. You'll be much less likely to need this command in the ADFS, although it can increase the speed of disc access.
*COPY	Similar to DFS. Copies a file from one directory into another.
*DELETE	Removes a file from the directory. A directory can only be deleted if it is empty.
*DESTROY	Deletes a list of files.
*DIR	Change the name of the currently selected directory.
*DISMOUNT	Should be used before removing a floppy disc from a drive to ensure all data is correctly updated on the disc.
*EX	Gives information about all file names in the directory.
*FREE	Displays the amount of free space left on a disc.
*INFO	Displays file information.
*LCAT	Catalogues the current library.
*LEX	Gives the information about all the files in the current library.
*LIB	Selects the current library name.
*MAP	Displays a map of the free space on a disc.
*MOUNT	Initialises a disc in a drive.
*REMOVE	This is just like the *DELETE command except that if the file did not exist no error message is given.
*RENAME	File and directory renaming.
*TITLE	Gives a title up to 19 characters long to the currently-selected directory.

Table IV: The ADFS commands

From Page 143

shown in Table V.

The new terminology can seem a little daunting at first, but it doesn't take long to learn. In many ways it is similar to MS-DOS, a powerful, commonly used 16 bit operating system.

The 1770 DFS seemed about as fast as the 1.20 DFS. This was confirmed by the benchmarks in Table VI. The ADFS was slower. As might be expected opening and closing files will take longer because of the more complex directory structure.

While disc reads were about the same speed, disc writes often took twice as long. This was disappointing, especially since in double density mode it's supposed to have a higher data transfer rate than a single density system.

Still, I'll be fitting the ADFS to my machine. The extra storage space and the better disc organisation more than compensates for the limitation in outright speed.

&70	Read the master sequence number and status byte.
&71	Read the free space (*FREE).
&72	Write to the disc controller (like OSWORD &7F in the DFS).
&73	Read the last error information.

Table V: ADFS Osword calls

		DFS 0.90	DFS 1.20	DFS 2.0j	DFS 2.20	ADFS 1.30
1	OPEN + CLOSE files*1000	4.3	5.1	6.6	8.1	21.7
2a	PRINT 1000 numbers	15.7	6.7	6.4	9.8	13.3
2b	PRINT 100 strings	61.0	24.8	25.3	24.8	46.4
3a	INPUT 1000 numbers	12.6	5.8	6.0	6.1	6.2
3b	INPUT 100 strings	57.1	23.0	24.2	24.0	23.2
4	BPUT 1000 bytes	5.0	3.4	3.5	4.1	8.0
5	BGET 1000 bytes	3.9	2.5	3.2	3.9	3.4
6	Move PTR 1000 places	2.2	2.2	2.9	3.1	6.8
7a	Write test relative file	62.9	25.9	26.4	25.8	48.6
7b	Read test relative file	58.4	23.5	24.6	24.7	23.8
8a	Write relative file backwards	240.3	99.6	97.4	99.6	69.2
8b	Read relative file backwards	99.9	39.2	40.5	40.4	22.6

Table VI: DFS benchmarks in seconds

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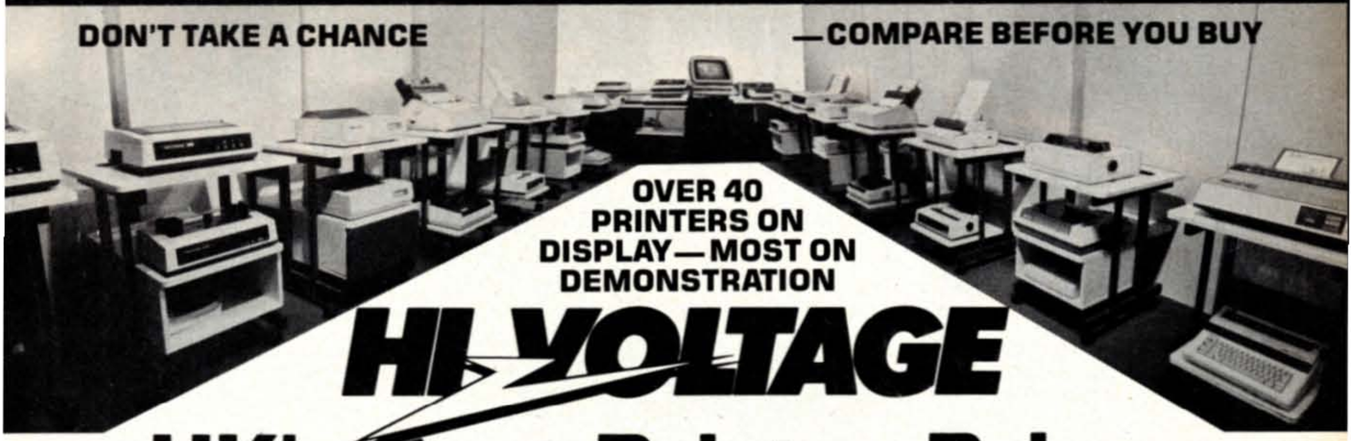

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3 Is the BBC Basic ROM 8, 16, 24 or 32k in size?

4 Which of the 6845 registers allow the screen start address to be altered?

5 What do locations &204 and &205 point to?

6 Which star command selects the ROM filing system?

7 What frequency is the header tone for BBC tape files?

8 Which of the following CPUs does the 6502 second processor use: 6502A, 65C02, 65A02 or the 65B02?

9 Is LDX &8000,Y a valid 6502 instruction?

10 What does ERR 254 indicate?

Answers next month

Answers to last quiz:

1. 8255.
2. Floppy Disc Controller.
3. 40 pins.
4. OSBYTE 213.
5. Yes.
6. BRK.
7. &5800.
8. 27128.
9. VDU 25.
10. Unrecognised OSBYTE call.

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Multiplexing for fun – plus profit

Exercise 33 in MIKE COOK's course on BBC body building

THERE comes a time in everyone's life when you run out of inputs or outputs. Sadly the finite number of usable lines is a limitation we mortals have to bear.

Still all is not lost – help is at hand. Is it a bird? Is it a plane? No it's a multiplexer!

Seriously though, the BBC Micro has an 8 bit user port, which is more than many computers have, and a general purpose 1MHz bus.

In the August 1984 *Micro User* I described a user port expansion board that added two extra VIAs to this bus. This allowed four extra user ports to be connected giving an additional 32 inputs or outputs as well as the timers and shift registers in the extra VIAs.

The great advantage of using a VIA is that a byte of information is available with a single operation. This is just what is required for digital/analogue converters and other such interfacing equipment.

However, for many control applications there is a cheaper solution to adding extra input/output capability to your computer, and that is to use multiplexing.

This technique allows a single bit to be output or a single line to be sensed independently of any others. It can be used to expand the humble 8 bit user port to handle 64 inputs and 64 outputs, making a total of 128 lines.

Well that's probably more than anyone will need, so our circuit will be limited to 32 inputs and 32 outputs, although we will see how easily this could be expanded to the full 128.

So what is multiplexing? It is the sharing of more than one signal on a single transmission channel. There are two types – time division multiplexing and frequency division multiplexing.

Frequency division multiplexing is what happens on the radio spectrum. We sort out what channel we want by "tuning in" a radio or demultiplexer.

This technique is also used in placing many telephone calls on one line, which explains why you do not always get your own telephone conversation.

In computer systems time division multiplexing is used. Here a line carries different signals at different times.

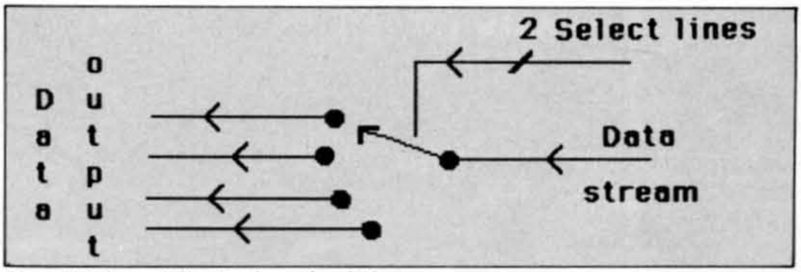

Figure II: 1 line to 4 line decoder or demultiplexer

To place these signals on to a line we need a multiplexer, which is basically a switch as shown in Figure I.

Four different channels of data arrive on separate lines and one of them is switched on to the transmission line. The position of the switch is determined by data select lines.

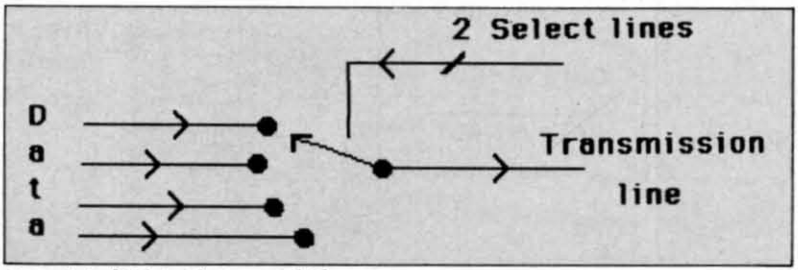

Figure I: 1 of 4 data selector or multiplexer

In this case we have four data input lines. We need two select lines to allow us to specify any line. As this selects a data line a multiplexer is sometimes called a "data selector".

To unscramble this we need a demultiplexer, and the basic arrangement is shown in Figure II. This has one line coming in and can be switched on to one of four lines.

Again two select lines are required to specify which position the switch is set to. This demultiplexer is sometimes called a "line decoder".

You should note that the same circuit can't be used for both functions, as logic circuits can only transmit signals in one direction.

These multiplexers and demultiplexers can be obtained cheaply in a single IC, but it is instructive to see how they can be fabricated using NAND gates.

Remember, everything that was ever built in digital logic consists of NAND gates. It is just that it is simpler if we think of specific amalgamations of gates as separate functions.

At the risk of teaching my father's mother to gum oeufs, Figure III shows the truth table of a NAND gate.

If you consider that A is the data line

→

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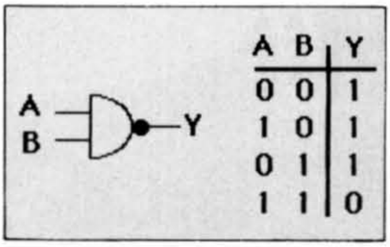
and B is a control line, when B is low (logic 0) it does not matter what happens to line A, the output is fixed.

However, when B is high (logic 1) the output Y is the inverse of the data input A. In other words, line B allows data to pass through or not depending upon its logic level.



A	B	Y
0	0	1
1	0	1
0	1	1
1	1	0

Figure III: The truth table for a NAND gate

Let's extend this to make a simple two input multiplexer or data selector. This is shown in Figure IV. Two gates are used (B and C) to input the two data streams.

The select line is applied to both gates and the inverter gate D ensures that one gate is open and the other is closed.

Gate A mixes the two streams and inverts the inverted data thus placing it the right way up. So on the output we have the logic value on data input 0 if the select line is at a zero or the logic value on data input 1 if the select line is at a one. Thus we can select which data we want to pass through to the output.

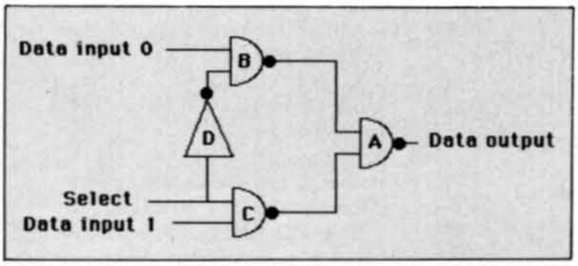


Figure IV: A simple multiplexer

In a similar way, Figure V shows how we can also make a simple demultiplexer. Again the select line is fed to both gates A and B in a complementary form, ensuring that only one gate is transmitting data.

As the NAND gates invert data it is pre-inverted before it is applied to both gates. The data simply appears on the output of the gate that is transmiting data and a logic one appears at the other gate.

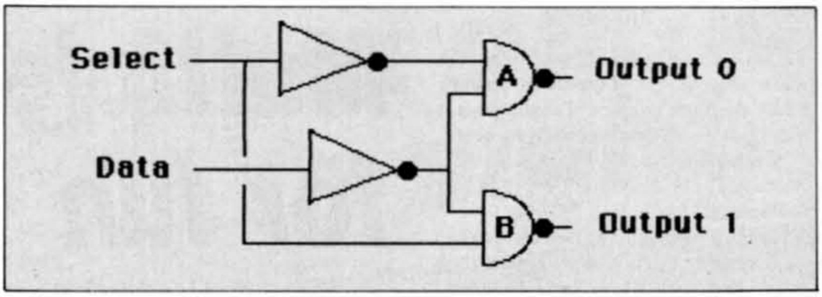


Figure V: A simple demultiplexer

So if the select line is zero whatever is on the data line appears on output zero. Similarly, when the select line is at one the data appears at output 1.

Using more gates we can expand the number of lines used in either multiplexer or demultiplexer. This is normally done in powers of two as this mirrors the number of different logic combinations available on the select lines.

The 74LS151 shown in Figure VI is an eight input multiplexer. As there are eight inputs we need three select lines to specify any single one.

In addition there is a master strobe line which will prevent any input from reaching the output. There are two outputs from this device giving data and inverted data.

We can use this IC to build up the input side of our data expander. This is shown in Figure VII. As you can see, it is a two level select circuit.

One line from eight is selected with ICs 1 to 4 and the outputs of these are selected by IC5. The data line selected is thus transferred to bit 6 of the user port.

The first level of selectors is addressed by user port bits 0 to 2 and the final selector is addressed by bits 3 to 5.

These are buffered, as the VIA is only rated at supplying one LS TTL load. Because the address lines are inverted the labelling on the inputs is inverted to ensure that they end up the right way round.

You will see that I have labelled the inputs 1 to 32 instead of the more accurate 0 to 31. This is because that is how they are labelled on the connector.

This means that the driving software must subtract 1 from the channel number to get the address to place on the user port bits 0 to 5.

You will notice that the final selector IC5 has four unused inputs. These can be used as extra inputs or can be fed from four selectors exactly like ICs 1 to 4.

This would give you a total of 64 inputs if you required. On the printed circuit board, of which more later, these extra inputs are just holes for soldering external wires.

To expand our outputs we need not only a demultiplexer but also a latch.

You see, with a simple demultiplexer

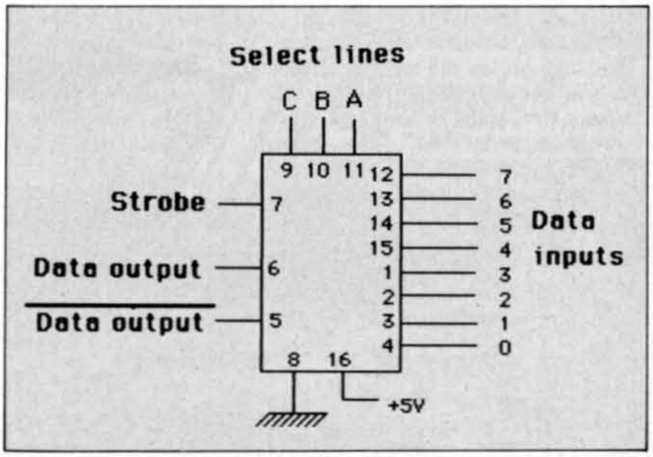


Figure VI: The 74LS151, an eight input multiplexer

the output is only valid when that output is being selected. At all other times it is at a logic one. Therefore we couldn't set all the outputs low.

What we need is a latch to remember the state of the output line when it was last selected. Fortunately this circuit is available as in IC and is called a 74LS259 addressable latch. The block diagram is shown in Figure VIII and the pinout in Figure IX.

You can see it consists of both demultiplexer and latches. A strobe line controls when a selected latch will be written to and a clear line can put all the latches to logic zero.

There is one of these devices already in your BBC Micro attached to the system VIA and controlling access to the sound chips and keyboard LEDs.

As Figure X demonstrates, we can use this as an output expander. Here the data is fed into the addressable latches ICs 7 to 10 from user port bit 7.

Bits 0 to 2 provide the latch addresses. CB2 is used to clock data into the latches through IC11. This IC is a simple demultiplexer that routes a pulse on CB2 to one of the four addressable latches.

Note that as in the previous circuit this could be expanded, as there are four outputs from IC11 that are not used for anything.

These can easily be wired to another

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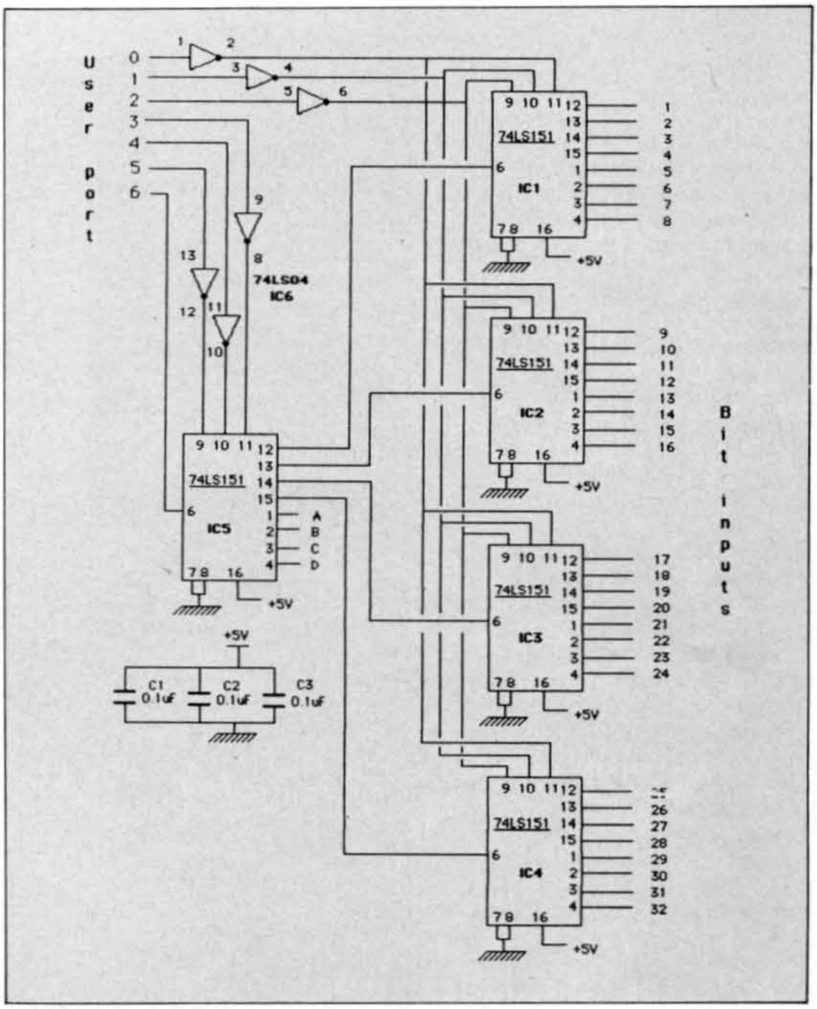
User port
0
1
2
3
4
5
6
74LS04
IC6
74LS151
IC1
IC2
IC3
IC4
IC5
A
B
C
D
+5V
C1 0.1uF
C2 0.1uF
C3 0.1uF
Bit inputs
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

Figure VII: Input expansion

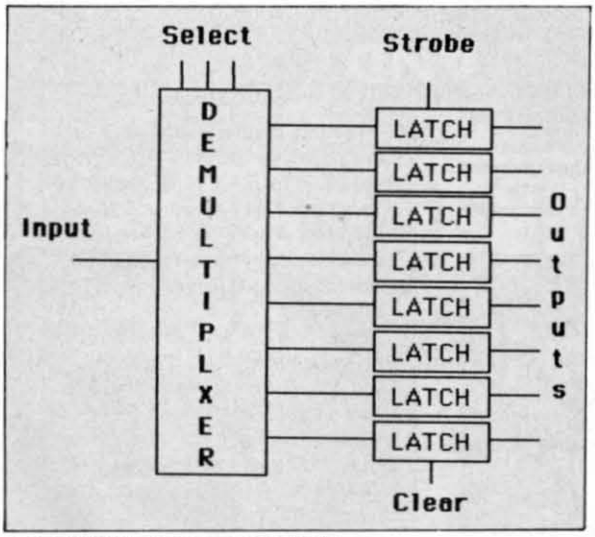
Select
Strobe
Input
DEMULTIPLXER
LATCH
LATCH
LATCH
LATCH
LATCH
LATCH
LATCH
LATCH
Outputs
Clear

Figure VIII: Block diagram of 74LS259

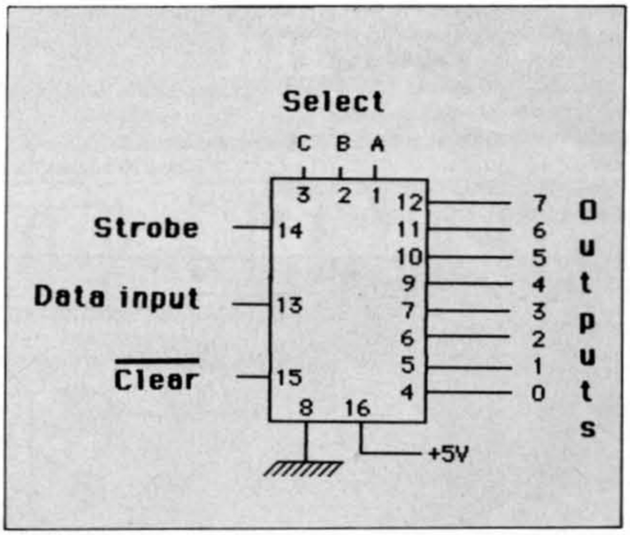
Select
C B A
3 2 1
Strobe
14
Data input
13
Clear
15
8 16
12 11 10 9 7 6 5 4
7 6 5 4 3 2 1 0
Outputs
+5V

Figure IX: Pinout of 74LS259

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bank of four addressable latches. IC6 again buffers the user port address lines.

Both Figure VII and Figure X make up this month's Body Build Pack No. 29. You can find the order form on page 198.

Note that there is only one buffer chip (IC6) for the both circuits. Splitting it up into two like this makes it easier to follow. Pack No. 29 contains all the ICs as well as a double-sided, plated-through-hole, printed circuit board.

You will also need a ribbon cable like Body Build pack No. 2 to connect it to the user port. This should be crimped up in a vice as shown in Figure XI.

The inputs and outputs are brought out to a 64 pin Eurocard connector. The plug and socket is supplied in the pack, but extra sockets are available separately – see the order form.

This allows you to solder up one mass of wires into it for one application and then plug in another application without having to do any unsoldering.

The plugs have long wires on for wire wrapping. I find I get a better, neater job if I cut them short, just leaving about a quarter of an inch. Construction simply involves soldering the ICs and sockets where shown on the printed circuit board.

Having built the hardware we need to drive it in software. This is shown in Listing I.

The two important parts are at the end of the listing and are the sections that can be incorporated into your own programs.

Also line 110 should be placed in your program to initialise the user port to have bit 6 an input with all the rest outputs.

Lines 800 to 830 are the function definition to drive the inputs. Like all functions it returns a value. This one returns the value of the input channel passed to it.

Line 810 adjusts the channel number

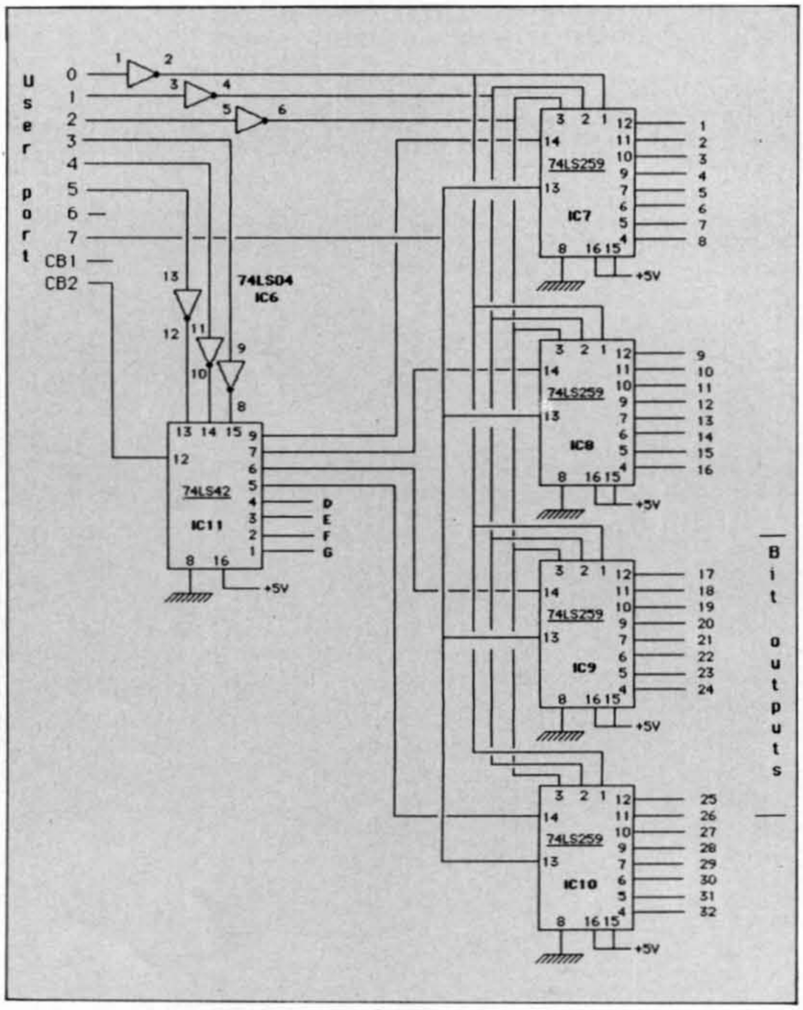

Figure X: Output expansion

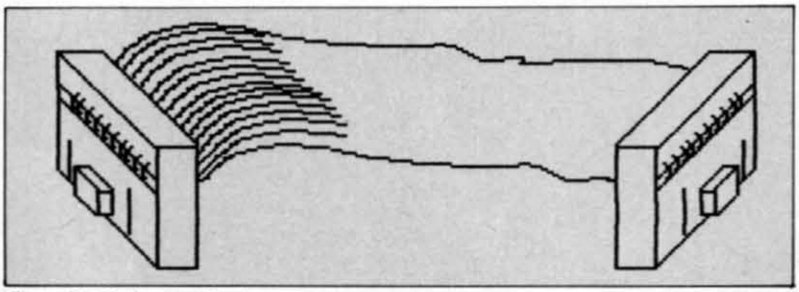

Figure XI: User port cable

***Component list for Body Build Pack 29:* 5 74LS151, 4 74LS259, 1 74LS04, 1 74LS42, 11 IC sockets, 1 64 pin plug, 1 64 pin socket, 1 20 way IDC plug, 4 stick-on rubber feet, 1 double sided plated-through-hole printed circuit board, 3 0.1uF capacitors.**

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as stated earlier and line 820 places the channel number on the selector lines. The AND &3F prevents any incorrect channel number being used.

Finally line 830 reads the user port and moves bit 6 down to bit 0 and masks out bit 7 so that 0 or 1 is returned depending upon the input state.

To output data we have a procedure at lines 720 to 790. This is passed two values, the channel number and the logic level it needs to be set at. Note the way this is written – this value could also be a logical variable.

After adjusting the channel number and limiting its size (lines 740,750) the value and channel number are placed on the user port at the same time (line 760).

Next we have to pulse control line CB2. This is done in line 770 (take it low) and line 780 (put it back high).

‘Now you can tackle that big interfacing job’

Note that we could have made control line CB2 pulse automatically whenever the user port was accessed but this would have resulted in corruption of output data whenever we read the input data.

The rest of the program allows the board to be tested. The setup procedure, lines 460 to 550, draws the labels and scan procedure, 640 to 710, reads all the inputs and displays them.

The outputs can also be changed. These are initially cleared to zero and a pointer is used to indicate the output you want to change. This can be moved with the < and > keys.

Once pointing at the desired output the keys 0 and 1 will set the output appropriately.

Well there you have it – almost limitless inputs and outputs. If you do want more you can always put several of these boards on to the user port extension board.

So now you can tackle that big interfacing job – the robot with 20 motors, or that train set with all those points, or that very special job that you are not telling anyone about in case it makes you a lot of money.

How about that large Christmas shop window display animated by computer?

See you next month – and have a merry Christmas.

```
   10 MODE 0
   20 PRINT
   30 PRINT"THE BEEB BODY BUILD COURS
E"
   40 PRINT"DECEMBER 1985"
   50 PRINT"By Mike COOK"
   60 PRINT"Multiplexed Input/Output"
   70 PRINTTAB(28,6);"INPUTS"
   80 PRINTTAB(28,16);"OUTPUTS"
   90 PRINTTAB(0,27);"USE < AND > KEY
S TO MOVE POINTER"
  100 PRINT"CHANGE OUTPUT WITH KEYS 1
 0 OR SPACE BAR"
  110 ?&FE62=&BF
  120 PROC_setup
  130 CH%=1
  140 V%=0
  150 PROC_updis(0)
  160 FOR A%=1 TO 32
  170 PROC_dout(A%,0)
  180 NEXT
  190 REPEAT
  200 B$=INKEY$(0)
  210 IF B$="" THEN PROC_scan ELSE PR
OC_action
  220 UNTIL FALSE
  230 DEF PROC_action
  240 IF B$="0" THEN PROC_dout(CH%,0)
  250 IF B$="1" THEN PROC_dout(CH%,1)
  260 IF B$="." THEN PROC_updis(1)
  270 IF B$="," THEN PROC_updis(-1)
  280 IF B$=" " THEN V%=V% EOR 1:PROC
_dout(CH%,V%)
  290 *FX15,1
  300 ENDPROC
  310 DEF PROC_updis(R%)
  320 PROC_pos
  330 PRINT" "
  340 CH%=CH%+R%
  350 IF CH%=0 THEN CH%=32
  360 IF CH%=33 THEN CH%=1
  370 PROC_pos
  380 PRINT"^"
  390 ENDPROC
  400 DEF PROC_pos
  410 LOCAL A%,C%
  420 IF CH%>16 THEN A%=24 ELSE A%=20
  430 C%=((CH%-1) AND &F)*4
  440 PRINTTAB(C%,A%);
  450 ENDPROC
  460 DEF PROC_setup
  470 FOR B%=0 TO 10 STEP 10
  480 PRINTTAB(0,7+B%)
  490 FOR A%=1 TO 32
  500 IF A%=17 THEN PRINTTAB(0,11+B%)
  510 A$=STR$(A%)
  520 PRINT A$;SPC(4-LEN(A$));
  530 NEXT
  540 NEXT
  550 ENDPROC
  560 DEF PROC_dout(C%,V%)
  570 LOCAL A%
  580 PROC_output(C%,V%)
  590 IF C%>16 THEN A%=23 ELSE A%=19
  600 C%=((C%-1) AND &F)*4
  610 PRINTTAB(C%,A%);
  620 IF V%=0 THEN PRINT"0" ELSE PRIN
T"1"
  630 ENDPROC
  640 DEF PROC_scan
  650 PRINTTAB(0,8)
  660 FOR A%=1 TO 32
  670 IF A%=17 THEN PRINT TAB(0,12)
  680 A$=STR$(FN_input(A%))
  690 PRINTA$;SPC(3);
  700 NEXT
  710 ENDPROC
  720  DEF PROC_output(C%,V%)
  730 LOCAL A%
  740 C%=C%-1
  750 C%=C% AND &3F
  760 IF V%=0 THEN ?&FE60=C% ELSE ?&F
E60=(&80 OR C%)
  770 ?&FE6C=(?&FE6C AND &DF) OR &C0
  780 ?&FE6C=?&FE6C OR &E0
  790 ENDPROC
  800 DEF FN_input(C%)
  810 C%=C%-1
  820 ?&FE60=(C% AND &3F)
  830 =(?&FE60 DIV 64) AND 1
```

Listing I

PROCEDURES and FUNCTIONS

resetsystem	Executed on start up and defines pointers and resets the high score table.
initwiz	Resets the player and his position and speed, initialising his sprite and also the spell sprite.
envelopes	Defines sound envelopes.
FNROOM	Plays a room. It sets up sprite, draws it and then executes the game score. *RM* = room number. *CV* when TRUE means the room is a cave. *DCOL* and *KCOL* are door/key colours. *DTP* is the exits byte, *LV* is the level. *OB* the object present (if any) and *ST* the staircase present (if any). It returns: – 1 you have won the game or are dead. 1, 2, 3, 4 if you have left at the left/top/right/bottom of the picture.
FNCV	Returns a random coordinate in the room.
init(M%)	Initialises the monster sprite number M%.
killed	Called if you have killed a monster and handles resetting the sprite and incrementing the score.
death	Handles your death-sounds and flashing screen.
objwrite	Plots the object on the screen that is in the room – if there is one.
resetgame	Starts a new game resetting all sprites and flags and setting score=0 and lives=2.
vwrite	Writes vertical text.
getobj	Deals with the player picking up an object.
iscore(N)	Adds N to the player's score updating the screen.
mccode	Sets up the machine code to print numbers in half the width of the normal screen characters (40 cpl).
stcase	Draws the staircase.
onegame	Plays one complete game.
goroom	Executes one "room" of play leaving variables set so it can be called again for the next room visited.
setlevels	Writes the level on the screen.
diamond	Draws the diamond.
hiscore	Prints the high score table.
big	Prints double height text in Mode 7.
bigc	Centralises large text.
update(N)	Prints item N from the high score table.
inscore	Adds a name to the high score table.
titles	The title page.
instructions	The instructions.
machinecode	Sets up the main machine code.
loadercode	Sets up a fast hex loader to load in the data statements.
prepare	Prepares the main program for execution and deletes unwanted parts.

From Page 69

```
  100 REM Wizard's Castle
  110 REM (c) The Micro User
  120 REM Line 3140 must be exactly a
s
  130 REM shown - no trailing spaces
  140 MODE7:VDU23;8202;0;0;0;
  150 PROCmachinecode
  160 HIMEM=&4A00
  170 PROCtitles:PROCresetsystem
  180 MODE5:VDU23;8202;0;0;0;:HIMEM=&
4A00:PROCinitwiz
  190 PROConegame
  200 MODE7:VDU23;8202;0;0;0;:HIMEM=&
4A00:PROChiscore
  210 GOTO 180
  220 END
→ 230 DEF PROCresetsystem
  240 DIM H$(8),H(8):FOR I=1 TO 8
  250 H$(I)="BBC Micro":H(I)=(9-I)*10
00
  260 NEXT
  270 *FX 229,1
  280 VDU 23,0,10,32,0,0,0,0,0,0
  290 *KEY0MODE7|MLIST|M
  300 *KEY1RENUMBER100|M
  310 *KEY10OLD|MRUN|M
  320 ?&AD0=10:?&AD1=15:?&AD2=20
  330 ?&AD3=15:?&AD4=10:?&AD5=5
  340 ?&AD6=15
  350 PROCmccode:PROCenvelopes
  360 opick=&4B00:contents=&4C00
  370 exits=&4D00:descrn=&4E00
  380 exits?204=51
  390 ENDPROC
→ 400 DEF PROCinitwiz
  410 VDU 23,0,10,32,0,0,0,0,0,0
  420 FORI%=&A00TO&A44 STEP4:!I%=0:NE
XT
  430 xc=&A00:yc=&A08:col=&A20:chr=&A
28
  440 FORI%=&A10TO&A1F:?I%=1:NEXT
  450 speed=&A30:spct=&A38:flags=&A40
  460 ?xc=128:?yc=128:?col=1:?chr=0
  470 ?speed=2:?spct=1:?flags=0
  480 keys=&AF0:chr?1=4:col?1=3
  490 ENDPROC
  500 DEF PROCenvelopes
  510 ENVELOPE 1,1,1,0,-1,201,0,0,0,0
,0,0,0,0
  520 ENVELOPE 2,1,-1,0,0,110,0,0,0,0
,0,0,0,0
  530 ENVELOPE 3,1,-1,0,0,100,0,0,127
,0,0,-127,126,0
  540 ENDPROC
  550 DEF FNROOM(RM,CV,DCOL,KCOL,DTP,
LV,OB,ST)
  560 GCOL0,3
  570 VDU19,1,0;0;19,2,0;0;19,3,0;0;
  580 VDU26,28,0,31,15,0,12,26:IFCV T
HENCALL&4F00 ELSECALL&4F03
?→ 590 LOCALX%,D%,XST,YST:D%=DTP
  600 XST=?xc:YST=?yc
  610 speed?1=3-LV:?&8D=LV
  620 LOCALA%:FORA%=0TO3:X%=D% AND3:D
%=D%DIV4
  630 IF A% MOD2=1 AND ST<>0 THEN X%=
0
  640 GCOL0,X%:IFX%=3THENGCOL0,1
  650 A%?&AE0=X%
?→ 660 CALL&4F0C:NEXT:flags?5=64
  670 X%=0:CALL&4F06:flags?1=64
  680 IF ROOM=38 THEN PROCdiamond
  690 IF OB THEN PROCobjwrite
  700 IF ST PROCstcase
  710 IF KCOL=0 THEN KCOL=ROOM MOD7+1
  720 IF DCOL=0 THEN DCOL=ROOM MOD7+1
?→ 730 VDU 19,1,KCOL EOR DCOL,0;0;19,2
,DCOL,0;0;19,3,KCOL,0;0;
  740 IF KCOL=DCOL THEN VDU19,1,ROOM
MOD7+1,0,0,0
  750 FOR M%=2 TO 4:PROCinitm(M%):NEX
T
  760 IF ROOM=38 THEN WIN=1:=-1
  770 CALL &4F09:*FX 15
  780 R%=?&8F:IFR%>4THENPROCdeathray:
```

```
PROCkilled:GOTO 770
  790 IF R%=3 THEN PROClf(lives):live
s=lives-1:PROCdeath:?xc=XST:?yc=YST:=
-1
  800 IF R%=1 THEN 830
  810 IF R%=2 THEN PROCgetobj:GOTO770
  820 GOTO 770
  830 IF ?xc>170 THEN R%=1
  840 IF ?yc<80 THEN R%=2
  850 IF ?xc<100 THEN R%=3
  860 IF ?yc>170 THEN R%=4
  870 R%=R%-1:IFR%?&AE0=0 THEN 770
  880 IF R%?&AE0=2 AND keys?DCOL=0 TH
EN 770
  890 ?xc=240-?xc:?yc=240-?yc:=R%
  900 GOTO770
  910 DEF FNCV=RND(130)+50
  920 DEF PROCinitm(N%)
  930 SOUND &11,0,0,0
  940 SOUND &10,-15,7,30
  950 SOUND 1,1,50,30
  960 xc?N%=FNCV:yc?N%=FNCV
  970 N%?&A10=1:N%?&A18=1
  980 IF ABS(xc?N%-xc?0)+ABS(yc?N%-yc
?0)<80 THEN 960
  990 chr?N%=8+RND(7):col?N%=RND(3)
 1000 flags?N%=0:speed?N%=1
 1010 spct?N%=RND(50)+30
 1020 X%=N%:CALL&4F06
 1030 ENDPROC
 1040 DEF PROCdeathray
 1050 SOUND &11,0,0,0:SOUND&10,-15,7,
22
 1060 SOUND 1,2,170,20
 1070 ENDPROC
 1080 DEF PROCkilled                 ←
 1090 FORI%=1TO7:X%=R%-3:CALL&4F06:NE
XT
 1100 PROCiscore(?(&AD0+(chr?X%-9)*2)
*10)
 1110 PROCinitm(X%):X%=1:CALL&4F06
 1120 flags?1=64:ENDPROC
 1130 DEFPROCdeath
 1140 SOUND&11,0,0,0:SOUND&11,3,120,2
0:SOUND&12,3,116,20:SOUND&13,3,120,20
 1150 TIME=0:FORI%=1TO10
 1160 TIME=0:REPEAT:UNTILTIME>9
 1170 VDU 19,0,(I% AND1)*7,0,0,0:NEXT
 1180 ENDPROC
 1190 DEF PROCobjwrite             ←
 1200 IF OB=0 OR opick?RM=1 THEN ENDP
ROC
 1210 xc?5=FNCV:yc?5=FNCV:flags?5=0
 1220 speed?5=127:spct=127
 1230 IF OB>7 THEN 1270
 1240 IF OB<>KCOL THEN PRINT"Erro/Ke
y and colour don't match":END
 1250 chr?5=5:col?5=3:X%=5:CALL&4F06
 1260 ENDPROC
 1270 chr?5=7:IF OB=8 THENcol?5=3:ELS
Ecol?5=RND(2)
 1280 IF OB=10 THEN col?5=1:chr?5=6
 1290 X%=5:CALL&4F06:ENDPROC
 1300 DEF PROCresetgame
 1310 RE=0:FORI%=0TO255:descrn?I%=des
crn?I% AND &BF:NEXT
 1320 FORI%=0TO252STEP4:I%!opick=0:NE
XT
 1330 FORI%=0TO7:keys?I%=0:NEXT:WIN=0
 1340 !&C00=!&5700:!&C04=!&5704
 1350 !&C08=!&5708:!&C0C=!&570C
 1360 PROCvwrite(1056,"Wizards"):PROC
vwrite(1184,"Castle")
 1370 score=0:lives=2
 1380 $(&CF0)="000000":MOVE1056,772
```

```
 1390 GCOL0,1:VDU5:CALL&4A00:VDU4
 1400 GCOL0,2:MOVE1040,788:DRAW1264,7
88:DRAW1264,724:DRAW1040,724:DRAW1040
,788
 1410 MOVE1040,316:DRAW 1040,76:DRAW1
264,76:DRAW1264,316:DRAW1040,316
 1420 MOVE1040,316:DRAW 1040,724:MOVE
 1264,316:DRAW1264,724
 1430 MOVE 1040,788:DRAW 1040,1008:DR
AW 1264,1008:DRAW 1264,788
 1440 MOVE1152,316:DRAW1152,724
 1450 GCOL 0,3:MOVE 1056,978:VDU5:PRI
NT;"Lvl ";:VDU4
 1460 PROCsetlevel
 1470 FORI%=0TO lives:PROClf(I%)←?
 1480 NEXT:PROCinitwiz:ENDPROC
 1490 DEF PROClf(N%)
 1500 MOVE 1024+(N% MOD3)*64+32,300-(
N%DIV3)*80
 1510 GCOL3,1:VDU5,224,10,8,225,4
 1520 ENDPROC
→1530 DEF PROCvwrite(X%,A$):FORI%=1TO
LEN(A$):GCOL0,3:MOVEX%,700-I%*40:VDU5
,ASC(MID$(A$,I%)),4:NEXT:ENDPROC
 1540 DEF PROCgetobj
 1550 opick?RM=1
 1560 X%=5:CALL&4F06:flags?5=64
 1570 IF OB<8 THEN keys?OB=1
 1580 IF OB=8 THEN PROCiscore(200)
 1590 IF OB=9 THEN PROCiscore(100)
 1600 IF OB=10 AND lives<8 THEN lives
=lives+1:PROClf(lives)
 1610 IF OB=10 THEN PROCiscore(250)
 1620 SOUND 2,-15,150,1:ENDPROC
→1630 DEF PROCiscore(N)
 1640 MOVE1056,772:GCOL3,1:VDU5
 1650 CALL&4A00:VDU4:score=score+N
 1660 $(&CF0)=RIGHT$("00000"+STR$(sco
re),6)
 1670 MOVE 1056,772:VDU5
 1680 CALL&4A00
 1690 VDU4:ENDPROC
→1700 DEF PROCmccode
 1710 RESTORE 1930
 1720 FOR PASS=0 TO 1
 1730 OP=PASS*2:P%=&4A00:oswrch=&FFEE
 1740 [OPT OP:lda #0:sta ptr
 1750 jsr print:jsr print:jsr print:r
ts
 1760 .print lda #0:ldx#7
 1770 .clear sta &C10,X:dex:bpl clear
 1780 jsr shiftld:jsr shiftld
 1790 lda#226:jmp oswrch
 1800 .ptr brk
 1810 .shiftld ldx #7
 1820 .shift asl &C10,X:asl &C10,X
 1830 asl &C10,X:asl &C10,X
 1840 dex:bpl shift:ldx ptr:inc ptr
 1850 lda &CF0,X:and#15:asl A:asl A
 1860 asl A:tax:ldy #0
 1870 .orloop lda &C10,Y:ora text,X
 1880 sta &C10,Y:inx:iny
 1890 cpy#8:bcc orloop:rts:]
 1900 text=P%:NEXT PASS:FORI%=0TO79
 1910 READA%:text?I%=A%:NEXTI%
 1920 ENDPROC
 1930 DATA 2,5,5,5,5,5,2,0
 1940 DATA 2,6,2,2,2,2,7,0
 1950 DATA 2,5,1,2,4,4,7,0
 1960 DATA 6,1,1,7,1,1,6,0
 1970 DATA 1,3,5,7,1,1,1,0
 1980 DATA 7,4,4,6,1,1,6,0
 1990 DATA 7,4,4,6,5,5,6,0
 2000 DATA 7,1,1,1,2,2,2,0
 2010 DATA 2,5,5,2,5,5,2,0
```

→

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```
 2020 DATA 3,5,5,3,1,1,1,0
 2030 DEF PROCstcase
 2040 GCOL 0,3:MOVE 184,362:DRAW 836,
362:MOVE184,662:DRAW836,662
 2050 FOR I%=284 TO 736 STEP64:MOVEI%
,362:DRAWI%,662:NEXT:ENDPROC
 2060 ENDPROC
 2070 DEF PROConegame
 2080 VDU19,1,0;0;19,2,0;0;19,3,0;0;
 2090 ROOM=37:PROCresetgame
 2100 REPEAT
 2110 PROCgoroom
 2120 UNTIL lives<0 OR WIN
 2130 IF WIN THEN RE=RE+64
 2140 FORI%=1TO7:IF keys?I% THEN RE=R
E+20
 2150 NEXT
 2160 RE=INT(RE/4.6+0.5)
 2170 VDU 26,28,2,5,14,1,17,129,12,26
,20,17,129
 2180 VDU 31,3,2:COLOUR2:PRINT"Game
Over":COLOUR3:VDU31,4,4:PRINT"Done ";
RIGHT$("0"+STR$RE,2);"%"
 2190 COLOUR128:TIME=0:REPEAT UNTIL T
IME>350:*FX 15
 2200 ENDPROC
 2210 DEF PROCgoroom
 2220 IF (descrn?ROOM AND64)=0 THEN R
E=RE+1:PROCiscore(10):descrn?ROOM=des
crn?ROOM OR 64
 2230 LOCAL OB:OB=contents?ROOM
 2240 LOCAL ST:ST=(OB AND &30)
 2250 OB=OB AND 15
 2260 LOCAL Z,RS:Z=ROOM?descrn
 2270 RS=FNROOM(ROOM,Z AND 128,(Z DIV
 8)AND 7,Z AND 7,ROOM?exits,3-ROOM DI
V64,OB,ST)
 2280 IF RS<0 THEN ENDPROC
 2290 IF R%=0 THEN ROOM=ROOM+1
 2300 IF R%=1 THEN ROOM=ROOM-8
 2310 IF R%=2 THEN ROOM=ROOM-1
 2320 IF R%=3 THEN ROOM=ROOM+8
 2330 IF ST=0 THEN ENDPROC
 2340 IF ST=16 AND R%=0 THEN ROOM=ROO
M+64
 2350 IF ST=32 AND R%=2 THEN ROOM=ROO
M-64
 2360 PROCsetlevel
 2370 ENDPROC
 2380 DEF PROCsetlevel
 2390 VDU 31,17,5,32,32:GCOL0,1
 2400 MOVE1116,864:VDU5,49+ROOM DIV64
,4
 2410 ENDPROC
 2420 DEF PROCdiamond
 2430 GCOL0,2:M%=4
 2440 FOR I%=0 TO 360 STEP 45
 2450 X%=COS(RAD(I%))*220+512
 2460 Y%=SIN(RAD(I%))*220+512
 2470 PLOT M%,X%,Y%:DRAW512,512:M%=5
 2480 MOVE X%,Y%:NEXT
 2490 VDU 19,2,12,0,0,0:ENDPROC
→ 2500 DEF PROChiscore
 2510 VDU 23,0,10,32,0,0,0,0,0,0
 2520 IF score>=H(8) THEN PROCinscore
 2530 CLS:FOR I=1 TO 8
 2540 PROCupdate(I):NEXT I
 2550 PROCbig(8,1,1,"Today's best Exp
lorers")
 2560 PROCbig(10,22,5,"Press SPACE to
 continue"):*FX 15
 2570 REPEAT:PROCupdate(RND(8)):UNTIL
INKEY$(0)=" "
 2580 ENDPROC
 2590 DEF PROCbig(X,Y,C,A$):LOCALI:FO
RI=Y TOY+1:VDU31,X-2,I,141,128+C:PRIN
TA$;:NEXT:ENDPROC
 2600 DEF PROCupdate(N)
 2610 LOCAL C:C=RND(7)
 2620 LOCAL V:V=N*2+3:PROCbig(3,V,C,S
TR$(N)+"."):PROCbig(7,V,C,LEFT$(H$(N)
+" "+STRING$(27,"."),20))
 2630 PROCbig(32,V,C,STR$(H(N)))
 2640 ENDPROC
 2650 DEF PROCinscore
 2660 CLS:PROCbig(2,2,5,CHR$136+"Cong
ratulations."+CHR$137+CHR$130+"You ha
ve made")
 2670 PROCbig(4,5,2,"it to the"+CHR$1
31+"High Score"+CHR$130+"table")
 2680 PROCbig(8,8,6,"Type your name b
elow")
 2690 LOCAL A$,C$:C$="":*FX 15
 2700 REPEAT
 2710 PROCbig(10,12,2,LEFT$(C$+STRING
$(20,"."),20))
 2720 A$=GET$
 2730 IF A$>="A" AND A$<="Z" OR A$>="
a" AND A$<="z" OR A$=" " THEN C$=C$+A
$
 2740 IF ASC(A$)=127 AND C$<>"" THEN
C$=LEFT$(C$,LEN(C$)-1)
 2750 C$=LEFT$(C$,20):UNTIL ASC(A$)=1
3
 2760 H$(8)=C$:H(8)=score
 2770 LOCAL L,V,V$:L=8
 2780 IF H(L)<H(L-1) OR L=1 THEN ENDP
ROC
 2790 V$=H$(L):H$(L)=H$(L-1):H$(L-1)=
V$
 2800 V=H(L):H(L)=H(L-1):H(L-1)=V
 2810 L=L-1:GOTO 2780
 2820 DEF PROCbigc(Y,C,A$):PROCbig(20
-LEN(A$)DIV2,Y,C,A$):ENDPROC
 2830 DEF PROCtitles
 2840 PROCbigc(2,3,"Wizard's Castle")
 2850 FORI=1TO4:VDU 31,8,I,132,157,31
,32,I,156:NEXT
 2860 PROCbigc(8,5,"Written by Paul R
obson 1984")
 2870 PROCbigc(17,4,"Press SPACE to p
lay game"):PROCbigc(20,4,"Press RETN
for instructions")
 2880 *FX 15
 2890 REPEAT:A$=GET$:UNTILA$=" " OR A
SC(A$)=13
 2900 IF ASC(A$)=13 THEN PROCinstruct
ions
 2910 ENDPROC
 2920 DEF PROCspace:*FX 15
 2930 REPEAT:UNTILGET=32:ENDPROC
 2940 DEF PROCinstructions
 2950 FORI=0TO24:VDU31,0,I,130:NEXTI
 2960 PROCbigc(23,5,"Press SPACE for
more ..")
 2970 VDU 26,28,1,22,38,6
 2980 CLS:PRINT" You are a mercenary
explorer who has"''"undertaken to fin
d an amazing"''"jewel.You have been t
aken to a"''"castle deep in the fores
t,and have"''"entered the castle.A fe
llow mercenary"''"has warned you of t
he dangers"'
 2990 PRINT"therein-hideous monsters,
locked doors"''"strange rooms which h
ave but one exit"
 3000 PROCspace
 3010 CLS:PRINT"And many hideous mons
ters of the"''"night.But there are al
so mysterious"''"potions that will re
store you to"''"life (you already hav
e three of"''"these),and Acorns made
of precious"''"metals in all the colo
urs of the"
 3020 PRINT'"rainbow.There are 4 such
 levels to"''"be explored,but worse t
hings are there"
 3030 PROCspace:CLS
 3040 PRINT" You must find the jewel.
Upon"''"discovery,the wizard will be"
''"banished forever to the Icy Wastes
"''"You remember the last words of yo
ur"''"instructions 'It is said,in our
 old"''"writings that the jewel lies"
 3050 PRINT'"behind the locked light
blue door":PROCspace:CLS
 3060 PRINT" Your only defence - a za
p spell you"''"learnt from your maste
r when you"''"were apprenticed"
```

```
 3070 PRINT'"   Keys :-"
 3080 PRINT'"    Z       .. Move left"
 3090 PRINT'"    X       .. Move right
"
 3100 PRINT'"    /       .. Move down"
 3110 PRINT'"    :       .. Move up"
 3120 PRINT'"    RETURN .. cast spell
";
 3130 PROCspace:CLS:ENDPROC
 3140 REM MARKER
 3150 DEF PROCmachinecode
 3160 L%=3440:RESTORE 3670
 3170 !&80=&6C00:PROCloadercode
 3180 READ A$,B$:$(&A00)=A$:CALL&A80
 3190 T%=!&82 AND65535
 3200 IF T%<>EVAL(CHR$38+B$) THEN PRI
NT "Error in line ";L%:END
 3210 L%=L%+10:IF(!&80 AND65535)<&780
0 THEN 3180
 3220 PROCprepare
 3230 DEF PROCloadercode
 3240 FOR PASS=0 TO 1:P%=&A80
 3250 [OPT PASS*2
 3260 lda #0:sta &85:sta &82:sta &83
```

```
 3270 .copier
 3280 jsr cget:cmp #13:beq endcopy
 3290 jsr range:bcs error
 3300 asl A:asl A:asl A:asl A:sta &86
 3310 jsr cget:cmp#13:beq error
 3320 jsr range:bcs error
 3330 ora &86:sta &86
 3340 ldy #0:sta (&80),Y
 3350 inc &80:bne P%+4:inc &81
 3360 lda &86:clc:adc &82:sta &82
 3370 bcc copier:inc &83:jmp copier
 3380 .error lda #255:sta &83:sta &82
 3390 .endcopy rts
 3400 .range cmp #48:bcc failed
 3410 cmp #58:bcs skip1
 3420 and #15:clc:rts
 3430 .skip1 cmp #65:bcc failed
 3440 cmp #ASC"G":bcs failed
 3450 and #15:clc:adc#9:clc:rts
 3460 .failed sec:rts
 3470 .cget
 3480 ldx &85:lda &A00,X:cmp #13
 3490 beq P%+4:inc &85:cmp#0:rts
 3500 ]:NEXT PASS:ENDPROC
```

```
 3510 DEF PROCprepare
 3520 *FX 18
 3530 W%=PAGE
 3540 REPEAT W%=W%+W%?3:UNTIL $(W%+7)
="MARKER" OR W%?1>127
 3550 IF W%?1>127 THEN PRINT"Line 314
0 is wrong !":END
 3560 $(&C00)="KEY0W%?1=255|M150|MCAL
L&C40|MRUN|M"
 3570 X%=0:Y%=12:CALL&FFF7
 3580 P%=&C40:[OPT 2
 3590 .loop ldy #0:lda (&80),Y
 3600 sta (&82),Y:inc &80:inc &82
 3610 bne loop:inc &81:inc &83
 3620 lda &81:bpl loop:rts:]
 3630 !&80=&6C00:!&82=&4C00
 3640 *FX 15
 3650 *FX 138,0,128
 3660 END
 3670 DATA 0000000A0A1009000008000A08
100A000000000000910090808090000000,00
9C
 3680 DATA 0A00000A000000000000000000
0800080000000A000A090A000001000002,00
4E
 3690 DATA 0000000003000A00002000000A
000000002000000A000000102000080000,00
99
 3700 DATA 0000000000000000000A0A0808
0000000000000000000000080000000A00,00
40
 3710 DATA 000000040000100A0000000710
00090000000800000000000A09080A2000,00
8B
 3720 DATA 100A000A001000000000000000
0000080008000005000000000000000000,00
49
 3730 DATA 00000A00000000000000A20009
000900200000000000000000A00000000,00
70
 3740 DATA 00080000200A0A000020000000
00000900000A0008000000000000000000,00
77
 3750 DATA 000A0008000000600000000000
000000C3333312F31101D0CC40C3100511,05
1D
 3760 DATA 03FC053FFC81111140C44003FC
48C13315FC4440BF55FF32204C44CCC404,0C
7F
 3770 DATA 4C4113FC07FF5440840C504002
2C040519113F3483E130C0701111504405,08
A9
 3780 DATA 70313C11F0CC44C1F4C31111FC
44453D340F63F314CC4CC31110040CF3FC,0C
F2
```

→

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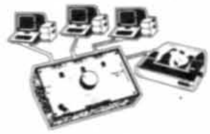

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```
 3790 DATA C4CCC3F0C3F3FCCC4CCFFC0FFF
FF0CCC07340E100F3F310C415151511141,0E
27
 3800 DATA 515005155515151515500122FF
30116B33048011BB1186445060BAA22AA0,08
86
 3810 DATA 0DCF341882AA20880C3714E80A
A2A2AA732111FC022A22280D30333C40E2,0A
18
 3820 DATA A31011E3F36081D444FF02F305
30C9E3383FFFFC1128CF10C8F2C0988350,0F
D7
 3830 DATA 4201042EFF88FCB84883FF10FF
8BFCB8841444FFFFFFFCB80114383F3C22,0F
3F
 3840 DATA 2228270A9192969C0C3D3E2B2E
3BAFB431158EB5A28A1A3A2527A19395C9,0B
35
 3850 DATA D2564959A1240F57EB713566A1
A4B3F21A2E1E6339A7A78B111F2A549193,0C
83
 3860 DATA BCAA152D0A1993A78CBF9B9CBF
89A0AA93B7BC34230D8CBDA3A63C3A160E,0D
AF
 3870 DATA A7A09C9C223F213F130F071C31
0E1F1C2C03132EA7B32C1D1A092D0BADAD,07
C7
 3880 DATA 3B0C0E2B1F14ADADAD0F192123
3F263F211C2C1F1F1F250C0C2C14231322,05
65
 3890 DATA 3C150C3424312A1F1C2F3C26A4
A4A4A42B252C0BA4A4A5A41511061 3A4A4,09
0B
 3900 DATA A4A40D223C03A4A4A4A4351FAD
3DABBF93ADB39CA1AA89B493A7BAAAB3AE,10
04
 3910 DATA A394BE9A9EBBBCA6B5BEA4BDA5
9D9394AE8C8DAC97A78BBBA7BB91AFAA97,13
31
 3920 DATA 968EB4A78FA3B495BE9FB39ABC
A69AA7A5A44CAF4F4C764F4CD9524C2D54,10
2F
 3930 DATA 4C8C514CCC5248A91920EEFF86
8084816820EEFF8A20254F988571A90085,0E
04
 3940 DATA 72067126720671267 2A57120EE
FFA57220EEFF6048A5702901F0068A4898,0D
1E
 3950 DATA AA68ABA5702902F0048A49FFAA
A5702904F0049849FFA8684C124FA904A2,0D
8C
 3960 DATA 2EA02E203E4FA905A280A02E20
3E4F60A9078570206 34FA904A20FA00F20,09
F8
 3970 DATA 3E4FA905A219A005203E4FA905
A242A02E203E4FA904A219A005203E4FA9,09
B8
 3980 DATA 05A280A005203E4FC67010CC60
A907857020634FA904A20FA00F203E4FA2,0A
BE
 3990 DATA 19A00520E44FA241A00E20E44F
A259A00220E44FA905A280A005203E4FC6,0B
CD
 4000 DATA 7010D24C0050BA489848A90520
3E4FA905A280A080203E4F68A868AAA904,0B
67
 4010 DATA 203E4F60A91A20EEFFA91C20EE
FFA90320EEFFA91920EEFFA90C20EEFFA9,0F
A2
 4020 DATA 0620EEFFA90C20EEFFA91A4CEE
FF070306040501020020 7D51A573857020,0B
08
 4030 DATA 3E50A5748570A904A26FA02E20
3E4FA904A274A02E203E4FA955A26FA013,0B
D5
 4040 DATA 203E4FA955A274A013203E4FA9
04A26FA013203E4FA904A280A013203E4F,0A
6E
 4050 DATA A955A280A00C203E4FA904A27A
A013203E4FA905A27AA02E203E4FA90585,0B
1A
 4060 DATA 75A91A20A350A92120A350A928
20A3506048A8A904A26F203E4F68A8A575,0B
F1
 4070 DATA A280203E4F60207D51A5738570
20C450A5748570A904A26FA02E203E4FA9,0C
4E
 4080 DATA 04A280A02E203E4FA955A26FA0
13203E4FA955A280A013203E4FA904A276,0B
55
 4090 DATA A02E203E4FA907A276A013203E
4FA9078575 4C935060207D51A573857020,0A
F7
 4100 DATA 1051A5748570A904A26FA02E20
3E4FA905A26FA013203E4FA905A276A00A,0B
37
 4110 DATA 203E4FA905A280A00A203E4FA9
04A275A02E203E4FA905A275A017203E4F,0A
3C
 4120 DATA A905A279A013203E4FA905A280
A013203E4FA904A276A00A203E4FA905A2,0A
C5
 4130 DATA 79A013203E4FA904A26FA01320
3E4FA905A275A017203E4F6029030AAABD,0A
1D
 4140 DATA 28508573BD2950857460E001D0
034CB650E002D0034C3050E003D0034C02,0B
8A
 4150 DATA 5160291F0A0A0A0A85848A4A48
29038583684A4A0AAABD1152858 0BD1252,09
70
 4160 DATA 8581982907858298 4A4A4A291F
0AAA18BD4B526580858 0BD4C5265818581,0B
EA
 4170 DATA A9008586A58248A58348208652
6885836885 82E682A582C9089011A90085,0D
99
 4180 DATA 82A58018694085 80A581690185
81E686A586C910D0D0600000000800100018,0B
A3
 4190 DATA 00200028003000380040004800
5000580060006800700078008000880090,05
28
 4200 DATA 009800A000A800B000B800C000
C800D000D800E000005840 59805AC05B00,0A
3E
 4210 DATA 5D405E805FC060006240638064
C0650067406880 69C06A006C406D806EC0,0B
F1
 4220 DATA 6F007140728073C07400764077
8078C079007B60A586186584AABD005785,0C
61
 4230 DATA 85A58130F0C97FF0ECC95890E8
A585100DA683BDC852A4822576518091 80,10
72
 4240 DATA E683A583C904900BA9008583A5
82186908 85820685A585D0D66088442211,0D
1B
 4250 DATA 2903AABDD552857660000FF0FF
8A48BD200A20CC526848AABD280A48BD08,0C
60
 4260 DATA 0AA8BD000AAA6820A25168AA60
8A48E002900FE005B00B204A56BD100A1D,0A
B7
 4270 DATA 180AF0F568AABD400AF0016020
D952E001D011C68E100DA900858EAD410A,0C
A3
 4280 DATA 09408D410A60E000D028AD100A
0D180AF00320FC55A200BD280A49019D28,09
53
 4290 DATA 0ABD100AF00E29028571BD280A
29010571 9D280ABD100A0A0A187D000A8D,07
75
 4300 DATA D753BD180A0A0A187D080A8DD8
53A000ADD75320A453B016A001ADD85320,0B
69
 4310 DATA A453B00CADD7539D000AADD853
9D080A8A482027556 8AAE0029005A9009D,0B
F5
 4320 DATA 400A20D9526038E92E102C297F
C9139026BD400A09809D400AC000D00DBD,0A
8B
 4330 DATA 100A49FF1869019D100A38 60BD
180A49FF1869019D180A386018602E7100,08
4A
 4340 DATA 08488A48984820FC5320FC5320
FC5320FC5320FC5320FC5320FC5368A868,0D
83
 4350 DATA AA682860E687A587C905 9002A9
008587D003209955A687BD400AD008BD38,0D
```

→

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```
2A
 4360 DATA 0AF004DE380A60BD300A9D380A
20F75260A9008D400A60A90D20BC54A9FB,0B
87
 4370 DATA 8D2002A9548D2102A90E20BC54
A9008588A588F0FCA900858820DA53AD41,0D
03
 4380 DATA 0A297F8D410A2940F00AA204AD
FB5520EB55D06AA203AD400A291CD038A2,0B
85
 4390 DATA 02AD400A2920D02FAD400A2980
F010AD000A20C354B01EAD080A20C354B0,0A
43
 4400 DATA 16AD410A2940D007AD410A291F
D067A9008D400A4C4554A201A9008D400A,09
4D
 4410 DATA 868FAD410A29408D410AA90D20
BC5460A204A0004CF4FF38E96430 06C92E,0B
CB
 4420 DATA B0023860186 0ADF9548D110AAD
FA548D190AAD000A8D010AAD080A8D090A,09
BD
 4430 DATA A20120D952A9008D410AA92885
8E4C6654FF000848A901858868 2860A205,0A
F6
 4440 DATA AD410A2904D09AA206AD410A29
08D091A207AD410A2910D088A9008D410A,0A
74
 4450 DATA 4C4554AD7F554901 8D7F552901
AABD000A8D8055E002B03FBD080A8D8155,0B
11
 4460 DATA A207EC7F55F02FBD400A2940D0
28BD000A38ED80552082 55D01CBD080A38,0B
9B
 4470 DATA ED8155208255D0108A48BD9355
AE7F551D400A9D400A68AACA10C9AE7F55,0D
18
 4480 DATA 6000306418691 0C9003007C920
B003A90060A9016001020408 1020A9008D,07
A9
 4490 DATA 100A8D180AADF95520EB55F005
A9FF8D100AADFA5520EB55F005A9018D10,0D
00
 4500 DATA 0AADF75520EB55F005A9FF8D18
0AADF85520EB55F005A9018D180AAD100A,0D
1E
 4510 DATA 0D180AD001 60AD100A8DF954AD
180A8DFA5460AAA0FFA98120F4FF98C900,0D
F2
 4520 DATA 60B7979EBDB6A20EA056A57749
808577300160A90720F1FF0300FAFF8C00,0E
1F
 4530 DATA 010060A203AC315698BC315638
7D31567D00809D3156CA10EFAD31566098,0B
66
 4540 DATA A9A9FF3C353A2C334137020301
```

```
040302033C373C32003A408678BD280AAA,07
D7
 4550 DATA BD3356A67818658D9D300ABD28
0AAABD4356857920175629 3FC579B017A6,0B
D2
 4560 DATA 78BD280AAABD2C568579201756
293FC579B032A67860A678BD000AAC000A,0B
7C
 4570 DATA 209F569D100ABD080AAC080A20
9F569D180A608CB256CDB256F005B006A9,0B
4A
 4580 DATA 0160A90060A9FF606420C656A6
789D100A20C656A6789D180AA678602017,0B
B5
 4590 DATA 562901D002A9FF600000000000
3C3C3C15151515153D3D3D000000000003,05
31
 4600 DATA 03030000000000030303000000
000003030300000000000303031038387C,01
1D
 4610 DATA 706C8AA28C84CC6CB9C6240010
38387C706C8AA2BC84CC6C38103800081C,0C
43
 4620 DATA 1C3E0E3651453D2133369D6324
00081C1C3E0E3651453D2133361C081C00,05
7E
 4630 DATA 0010083000C10241824281420 14
0800000000000000040A0BFA5400000000,03
C0
 4640 DATA 0000000000081C1C081C3E1C1C
1400000000000000081C1C3E3E3E413E1C,02
83
 4650 DATA 0810200000387C54D6D6FE6C7C
382810383810000000387C7C92B6FEFED6,0B
0C
 4660 DATA AAFEFEAA00003C24243C42DBDB
DBDBDB427E3C243C24041E1D3D3D5A3C2F,0B
97
 4670 DATA 373B2C2E266EFE003C5A5A243C
56A995A995283C3C6666C31C362A361C3E,09
BB
 4680 DATA 5D5D5D6B2A1C14363636000000
0044AAD6BAD6BAD6BA542800000000040A,0A
36
 4690 DATA 1D181818181818D8D8F060,0
3C5
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

DISKING INTERNATIONAL, FREEPOST, Liphook, Hants, GU30 7BR. tel (0428) 722563 [24hrs]

The **LOWEST** DISKETTE PRICES

FREE diskette storage

with every ten disks the superb **Flip 'n' File 10** worth £4.49 inc VAT! Or with fifty disks you may choose the superb **'Budget 50'** storage system (worth £10.24 inc VAT) with smoked perspex lid, dividers and non-slip rubber feet.

LOOK:-

Prices are per ten-pack, exc VAT but include FREE storage systems.

Description		1-4 ten-packs	5+ ten-packs
BL1D	S/S D/D 48 tpi	**10.00**	**8.58**
BL2D	D/S D/D 48 tpi	**12.00**	**10.58**
BL1DD	S/S Q/D 96 tpi	**12.00**	**10.58**
BL2DD	D/S Q/D 96 tpi	**14.00**	**12.58**

For specifications see below

In stock NOW - immediate despatch

PLUS FREE DISKING PLAYING CARDS WITH 20 DISCS OR MORE!

FLIP'N'FILE/10
For Floppy Disk Storage and Filing
STURDY DUST-FREE PROTECTION ◇ FAST EASEL-BACK WORK STATION
0 5¼" FLOPPY DISKS
ATIVE CONCEPTS
FLIP'N'FILE/10
DISKING
See us at the ELECTRON & BBC MICRO USER SHOW
New Horticultural Hall London SW1, Nov. 14-17

To DISKING, FREEPOST, Liphook, Hants, GU30 7BR
Please rush me the following order:-

Qty	Description	Price exc VAT
____	____________	________
____	____________	________

I choose the FREE Flip 'n' File 10's [ ] Budget 50 [ ]

Total goods value exc VAT ________
Total delivery & ins. ________
Sub total exc VAT ________
VAT ________
Value of cheque to DISKING ________
or charge our ACCESS or VISA number:-
____

Name: ________________
Address: ________________
____
____
tel no. ________________

welcome

How to Order - Government

We welcome orders from all Government bodies including Schools, Colleges, Universities, County Councils, Hospitals, Research Est.'s and the Armed Forces. Simply post or call with your official order no.

Non-government orders

All individuals and companies both public & private cash with order please. Just send in the completed coupon with your payment, or telephone your credit number 24 hours a day 7 days a week. DON'T WHISPER.

If the coupon's been cut, just send your order on any ol' piece of paper, with what you want, your name & address and your payment.

U.K. Post & Packing rates

1-2 packs each pack at 95p	6-9 packs each pack at 60p
3-5 packs each pack at 75p	10+ packs POST FREE

Diskette Specifications

These diskettes are made to our specification by a large reputable manufacturer. They are factory fresh, individually certified and come with envelopes, multicoloured user labels, write protect tabs, and a lifetime warranty. We know you will be deligthed with our products when you buy from us, but in the unlikely event that you are not, you may return the goods for a full refund, no questions asked.

DISKING renowned for the best QUALITY - NOW renowned for the BEST PRICES as well.

DISKING INTERNATIONAL, FREEPOST, Liphook, Hants, GU30 7BR. tel (0428) 722563 [24 hrs]

A SERIOUS CHOICE!

POWERFUL EASY TO USE MENU DRIVEN PROGRAMS

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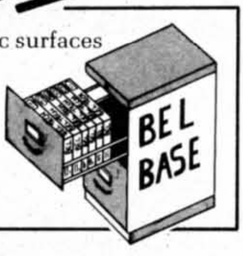
BEL BASE

- Emperical database for Names, Addresses, etc.
- Simple reports, label printing, etc.
- Calculations and Default values
- Sort/Search ● Own Reports

BEL BASE 2

The ultimate Disc based system.

- 2,400 Records of up to 20 Fields
- Option for Data File to cover 2 Disc surfaces
- Sort on any 3 Fields
- Search on any 3 Fields
- Forms, Mail Merge, Labels
- Own Reports
- Create Sub Files
- Input/Output to Wordprocessor
- Extensive Calculation Options



ROOM DESIGN, ENGINEERING DRAWING, LOGOS, FORMS, ARTWORK, PATTERNS, ETC.

BEL CAD

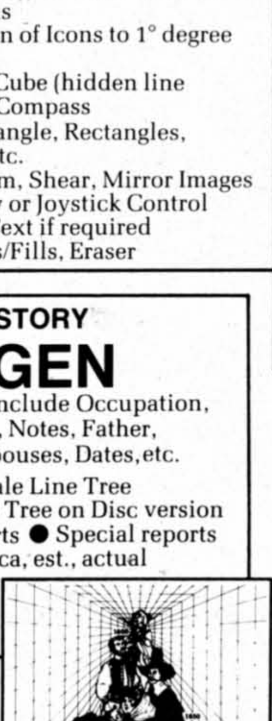
- Character & Icon Designer included
- Screen Dump for Epson or use own
- Access own Screen Dump Rom
- Line Drawing – Rubber Band or Continuous
- 3D Rotation of Icons to 1° degree resolution
- Cylinder, Cube (hidden line removal), Compass
- Circle, Triangle, Rectangles, Ellipses, etc.
- Scale, Zoom, Shear, Mirror Images
- Cursor Key or Joystick Control
- Enlarged Text if required
- 10 Patterns/Fills, Eraser

BEL CAD
DESIGN and ARTWORK
Circle

FAMILY HISTORY

BEL GEN

- 20 Fields include Occupation, Place, Will, Notes, Father, Mother, Spouses, Dates, etc.
- Male/Female Line Tree
- Trace Line Tree on Disc version
- Own reports ● Special reports
- Dates – circa, est., actual
- Extensive Edit facilities



GENERAL USE

BEL WORKBOX

15 Handy Programs for everyday use.
No nonsense set-up and fast operation.
Disc includes:

- Repetitive Label Printing
- Quick and easy Wordprocessor (80 column)
- Fast alpha/numeric Sort routine
- Numeric data manipulator (average, scale, invert, etc.)
- Statistic calculator (Means, Modes, Standard Deviations, etc.)
- Home Budgeting
- Mortgage/Investment Calculator
- Day of week calculator
- Character/Icon Designer

AND MORE!!

GRAPHICS

BEL GRAPH

- Extensive Edit/Sort facilities
- 4 Variable Data entries
- Automatic drawing of axes
- Optional self/automatic labelling
- Screen Dump for Epson or use own
- Access own Screen Dump Rom
- Save/Load Data and Screens
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- Plain/3D charts
- Negative numbers catered for
- Graphs, Overlays, Function Plotting, Parametrics
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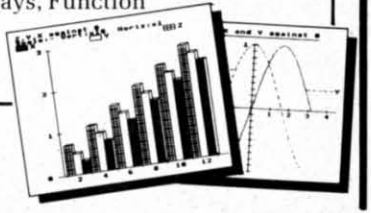

BEL TECH

Innovations in sophisticated software.

BEL TECH Software

ORDER FORM	Tape	Qty	Disc	Qty	TOTAL
BEL BASE	16.00		18.00		
BEL BASE 2	N/A		27.00		
BEL CHARTS	16.00		17.00		
BEL GEN Genealogy	15.00		23.00		
BEL GRAPH	25.00		27.00		
BEL PLOT	16.00		17.00		
BEL CAD	18.00		20.00		
WORK BOX	18.00		20.00		

TOTAL inc. P&P £

NAME
ADDRESS

COMPUTER TYPE MODEL
DISC (if applicable)

CREDIT CARD No. PAYMENT BY CHEQUE, P.O., VISA, ACCESS ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Please Complete and Return to: BEL TECH Limited, College House, St Leonard's Close, Bridgnorth, Shropshire WV16 4EW. **Tel: 07462 5420 (24 hrs).** MU

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```
  10 ON ERROR GOTO 1390
  20 REM Wordsquare Editor
  30 REM (c) The Micro User
  40 MODE 1
  50 PROCinit
  60 PROCread_data
  70 PROCclear_grid
  80 PROCscreen
  90 COLOUR 1
 100 count=0:add_word=0
 110 REPEAT
 120 rx=0:ry=0
 130 TIME=0:REPEAT UNTIL TIME>10
 140 IF INKEY(-74) PROCstart_end
 150 IF add_word=2 PROCvalidate
 160 IF INKEY(-26) rx=-1
 170 IF INKEY(-122) rx=1
 180 IF INKEY(-58) ry=-1
 190 IF INKEY(-42) ry=1
 200 mx=mx+rx:my=my+ry
 210 IF mx=width mx=0 ELSE IF mx<0 m
x=width-1
 220 IF my=height my=0 ELSE IF my<0
my=height-1
 230 VDU31,mx+topx+1,my+topy+1
 240 UNTIL count=words
 250 PROCrandom_fill
 260 PRINTTAB(0,27)"Printer Output (
Y/N) ?"
 270 *FX15,1
 280 key$=GET$
 290 IF key$="Y" OR key$="y" PROCpri
nt
 300 PRINTTAB(0,28)"Save data      (
Y/N) ?"
 310 *FX15,1
 320 key$=GET$
 330 IF key$="Y" OR key$="y" PROCspo
ol
 340 *FX4
 350 COLOUR 3
 360 END
 370 DEFPROCspool
 380 CLS
 390 *SPOOL S.WORDS
 400 PRINT"AUTO 5000"
 410 PRINT"DATA";width;",";height
 420 FORloop=0TOwords
 430 IF loop MOD 6=0 PRINT'"DATA";wo
rd$(loop); ELSE PRINT",";word$(loop);
 440 NEXT
 450 PRINT
 460 FORloop=0 TO letters-1
 470 IF loop MOD width=0 PRINT'"DATA
";
 480 VDU?(loop+grid)
 490 NEXT
 500 PRINT
 510 *SPOOL
 520 ENDPROC
 530 DEFPROCinit
 540 VDU23,224,&AA,&55,&AA,&55,&AA,&
55,&AA,&55
 550 *FX4,1
 560 ?&FE00=10:?&FE01=0
 570 DIMword$(30),wpos(1,1)
 580 READwidth,height
 590 letters=width*height
 600 DIM grid letters
 610 block=224
 620 topx=3:topy=3
 630 myx=0:myy=0
 640 ENDPROC
 650 DEFPROCread data
 660 word=0
 670 REPEAT
 680 READword$(word)
 690 word=word+1
 700 UNTILword$(word-1)="THEEND"
 710 words=word-1
 720 ENDPROC
 730 DEFPROCscreen
 740 PRINTTAB(topx,topy)STRING$(widt
h+2,CHR$(block))
 750 FORrow=1TOheight
 760 PRINTTAB(topx,row+topy)CHR$(blo
ck)STRING$(width,CHR$32)CHR$(block)"
 "
 770 NEXT
 780 PRINTTAB(topx,height+topy+1)STR
ING$(width+2,CHR$(block))
 790 FORrow=1TOwords
 800 PRINTTAB(30,row+2)word$(row-1)
 810 NEXT
 820 ENDPROC
 830 DEFPROCclear_grid
 840 FORloop=0 TO letters-1
 850 ?(loop+grid)=ASC" "
 860 NEXT
 870 ENDPROC
 880 DEFPROCrandom_fill
 890 COLOUR2
 900 FORloop=0 TO letters-1
 910 IF ?(loop+grid)=ASC" " ?(loop+g
rid)=RND(26)+64:PRINTTAB(loop MOD wid
th+topx+1,loop DIV width+topy+1)CHR$(
?(loop+grid))
 920 NEXT
 930 ENDPROC
 940 DEFPROCstart_end
 950 wpos(0,add_word)=mx
 960 wpos(1,add_word)=my
 970 add_word=add_word+1
 980 SOUND1,-15,100,1
 990 TIME=0:REPEAT UNTIL TIME>25
1000 PRINTTAB(0,0);
1010 IF add_word=1 PRINTCHR$(block)
ELSE PRINT;" "
1020 ENDPROC
1030 DEFPROCvalidate
1040 add_word=0
1050 IF wpos(0,0)=wpos(0,1) AND wpos
(1,0)=wpos(1,1) VDU7:ENDPROC
1060 dx=SGN(wpos(0,1)-wpos(0,0))
1070 dy=SGN(wpos(1,1)-wpos(1,0))
1080 Q%=dx*LEN(word$(count))+wpos(0,
0)
1090 R%=dy*LEN(word$(count))+wpos(1,
0)
1100 IF Q%<-1 OR Q%>width OR R%<-1 O
R R%>height VDU7:ENDPROC
1110 flag=FALSE:loop=0
1120 REPEAT
1130 char=?(grid+(loop*dx+wpos(0,0)+
(width*((loop*dy)+wpos(1,0)))))
1140 IF char<>ASC(MID$(word$(count),
loop+1,1)) AND char<>ASC" " THEN flag
=TRUE
1150 loop=loop+1
1160 UNTILloop=LEN(word$(count)) OR
flag
1170 IF flag VDU7:ENDPROC
1180 loop=0
1190 REPEAT
1200 Q%=loop*dx+wpos(0,0)
1210 R%=width*((loop*dy)+wpos(1,0))
1220 ?(grid+Q%+R%)=ASC(MID$(word$(co
unt),loop+1,1))
1230 PRINTTAB(Q%+topx+1,R%/width+top
y+1)MID$(word$(count),loop+1,1)
1240 loop=loop+1
1250 UNTILloop=LEN(word$(count))
1260 PRINTTAB(29,count+topy)"*"
1270 count=count+1
1280 ENDPROC
1290 DEFPROCprint
1300 *FX3,10
1310 PRINT''
1320 FORloop=0 TO letters-1
1330 IF loop MOD width=0 PRINT''STRI
NG$(10," ");
1340 VDU?(loop+grid),32,32
1350 NEXT
1360 PRINT''
1370 *FX3
1380 ENDPROC
1390 *FX3
1400 *FX4
1410 REPORT:PRINTERL:END
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

From Page 111

```
126,0,-126,126,126
  250 VDU23,224,255,255,255,255,255,2
55,255,255
  260 VDU23,225,24,60,102,195,195,102
,60,24
  270 VDU23,226,0,0,0,0,&F0,&F0,&F0,&
F0
  280 VDU23,227,0,0,0,0,&F,&F,&F,&F
  290 VDU23,228,0,0,0,129,195,102,60,
24
  300 VDU23,229,0,0,0,0,170,85,170,85
  310 VDU23,230,0,0,0,0,0,0,255,255
  320 VDU23,231,24,24,24,24,24,24,24,
24
  330 VDU23,232,24,0,24,48,102,102,60
,0
  340 VDU23,233,255,255,0,0,0,0,0,0
  350 VDU23,234,170,85,170,85,170,85,
170,85
  360 VDU23,235,&F0,&F0,&F0,&F0,&FF,&
FF,&FF,&FF
  370 c$=" "+STRING$(6,CHR$(224)):d$=
" "+CHR$(225)+CHR$(225)+"  "+CHR$(225
)+" "
  380 a$=STRING$(128," "):a$=STRING$(
5," ")
  390 FORI%=97 TO 122:a$=a$+" "+CHR$(
226)+CHR$(I%)+CHR$(227):NEXT
  400 a$=a$+STRING$(5," ")
  410 DATA17,137,17,10,228,17,11,224,
17,140,17,13,228,17,11,224
  420 wagon$="":RESTORE 410:FORI%=1 T
O 16:READJ%:wagon$=wagon$+CHR$(J%):NE
XT

  430 ENDPROC
  440 REM **********************
  450 DEFPROCtitles
  460 VDU20:CLS
  470 PRINT'''"   ALPHABET TRAIN"
  480 COLOUR2:PRINT''"   Z - train le
ft"
  490 COLOUR4:PRINT''"   X - train ri
ght"
  500 COLOUR5:PRINT''''"SPACE - take
letter"
  510 COLOUR15:PRINT''''"      Press a
 key"
  520 *FX15
  530 REPEATUNTILGET
  540 ENDPROC
  550 REM **********************
  560 DEFPROCscreen
  570 VDU20:CLS
  580 RESTORE 590
  590 DATA9,0,10,2,11,6,12,6,13,6,14,
8
  600 FORI%=1TO6:READcol1%,col2%
  610 VDU19,col1%,col2%,0,0,0
  620 NEXT
  630 X%=6:F%=-1
  640 COLOUR3:PRINTTAB(6,0)STRING$(13
,CHR$(229)):PRINTTAB(6,0)STRING$(13,C
HR$(230))
  650 PRINTTAB(6,1)CHR$(231):PRINTTAB
(6,2)CHR$(231):PRINTTAB(6,3)CHR$(232)
  660 COLOUR128:COLOUR7:PRINTTAB(0,17
)MID$(a$,X%,20);
  670 FORI%=1TO5:PRINT;wagon$;:NEXT
  680 COLOUR128:COLOUR6
  690 FORI%=1TO5:PRINT;" ";CHR$(225);
" ";CHR$(225);:NEXT
  700 COLOUR 4:PRINTSTRING$(20,CHR$(2
33));:COLOUR 129:COLOUR 5:PRINTSTRING
$(20,CHR$(234));:PRINTSTRING$(20,CHR$
(234));
  710 MOVE200,80:DRAW200,200:DRAW1080
,200:DRAW1080,80:DRAW200,80
  720 ENDPROC
  730 REM **********************
  740 DEFPROClorry_left
  750 b$=STRING$(6," ")+CHR$(235)
  760 FORI%=1 TO 7
  770 PROCmove_lorry
  780 NEXT
  790 ENDPROC
  800 REM **********************
  810 DEFPROCmove_lorry
  820 SOUND&10,1,3,50
  830 J%=20-I%:FORdelay%=1 TO 1000:NE
XT
  840 COLOUR6:PRINTTAB(J%,7)LEFT$(b$,
I%):COLOUR5:PRINTTAB(J%,8)LEFT$(c$,I%
):COLOUR3:PRINTTAB(J%,9)LEFT$(d$,I%)
  850 ENDPROC
  860 REM **********************
  870 DEFPROCmove_train
  880 PRINTTAB(0,17);:COLOUR7
  890 SOUND1,-15,200,1
  900 PROCshort_delay
  910 IF F% THEN PROCchange1 ELSE PRO
Cchange2
  920 PRINT;MID$(a$,X%,20)
  930 F%=NOT F%
  940 ENDPROC
  950 REM **********************
  960 DEFPROCshort_delay
  970 TIME=0
  980 REPEAT UNTIL TIME>15
  990 ENDPROC
 1000 REM **********************
 1010 DEFPROCchange1
 1020 VDU19,14,4,0,0,0,19,9,6,0,0,0,1
9,10,6,0,0,0,19,12,0,0,0,0,19,13,2,0,
0,0
 1030 ENDPROC
 1040 REM **********************
 1050 DEFPROCchange2
 1060 VDU19,14,8,0,0,0,19,9,0,0,0,0,1
9,10,2,0,0,0,19,12,6,0,0,0,19,13,6,0,
0,0
 1070 ENDPROC
 1080 REM **********************
 1090 DEFPROCcrane
 1100 L$=MID$(a$,X%+6,1):PROCget_lett
er
 1110 IF L$=MID$(word$,letter%,1) THE
N PROCright_letter ELSE PROCwrong_let
ter
 1120 ENDPROC
 1130 REM **********************
 1140 DEFPROCget_letter
 1150 hook$=CHR$(231)+CHR$(8)+CHR$(10
)+CHR$(232)
 1160 FORI%=3 TO 15
 1170 COLOUR3:PRINTTAB(6,I%)hook$
 1180 SOUND1,-15,170-I%*10,1:SOUND2,-
15,190-I%*10,1
 1190 PROCshort_delay
 1200 NEXT
 1210 hook$=CHR$(232)+CHR$(8)+CHR$(10
)+CHR$(17)+CHR$(7)+L$+CHR$(8)+CHR$(10
)+" "
 1220 FORI%=15 TO 3 STEP-1
 1230 COLOUR3:PRINTTAB(6,I%)hook$
 1240 SOUND1,-15,50+I%*10,1:SOUND2,-1
5,70+I%*10,1
 1250 PROCshort_delay
 1260 NEXT
 1270 ENDPROC
 1280 REM **********************
 1290 DEFPROCright_letter
 1300 FORI%=5 TO 12+letter%
 1310 COLOUR3:PRINTTAB(I%,1)" ";CHR$(
231):PRINTTAB(I%,2)" ";CHR$(231):PRIN
TTAB(I%,3)" ";CHR$(232):COLOUR7:PRINT
TAB(I%,4)" ";L$
 1320 PROCshort_delay
 1330 NEXT
 1340 FORI%=3 TO 5
 1350 COLOUR3:PRINTTAB(13+letter%,I%)
CHR$(231);CHR$(8);CHR$(10);CHR$(232);
CHR$(8);CHR$(10);CHR$(17);CHR$(7);L$
 1360 PROCshort_delay
 1370 SOUND1,-15,I%*3,3:SOUND2,-15,I%
*4,3
 1380 NEXT
 1390 FORI%=5 TO 3 STEP-1
 1400 COLOUR3:PRINTTAB(13+letter%,I%)
CHR$(232);CHR$(8);CHR$(10);" "
 1410 PROCshort_delay
 1420 NEXT
 1430 FORI%=12+letter% TO 6 STEP-1
 1440 COLOUR3:PRINTTAB(I%,1)CHR$(231)
;" ":PRINTTAB(I%,2)CHR$(231);" ":PRIN
TTAB(I%,3)CHR$(232);" "
 1450 PROCshort_delay
 1460 NEXT
 1470 COLOUR7:PRINTTAB(0,17)MID$(a$,X
%,20)
 1480 letter%=letter%+1
 1490 ENDPROC
 1500 REM **********************
 1510 DEFPROCwrong_letter
 1520 FORI%=31 TO 80
 1530 PRINTTAB(6,4)CHR$(I%)
 1540 SOUND&10,-15,RND(255),1:SOUND2,
-15,RND(255),1
 1550 FORdelay=1TO50:NEXT
 1560 NEXT
 1570 FORI%=3 TO 15
 1580 COLOUR3:PRINTTAB(6,I%)CHR$(231)
CHR$(8)CHR$(10)CHR$(232)CHR$(8)CHR$(1
0)CHR$(17)CHR$(7);L$
 1590 SOUND1,-15,170-I%*10,1:SOUND2,-
15,160-I%*10,1
 1600 PROCshort_delay
 1610 NEXT
 1620 FORI%=15 TO 3 STEP-1
 1630 COLOUR3:PRINTTAB(6,I%)CHR$(232)
CHR$(8)CHR$(10);" "
 1640 SOUND1,-15,20+I%*10,1:SOUND2,-1
5,30+I%*10,1
 1650 PROCshort_delay
 1660 NEXT
 1670 ENDPROC
 1680 REM **********************
 1690 DEFPROClorry_right
 1700 b$=" "+word$+MID$(b$,LEN(word$)
+2)
 1710 FORdelay%=1TO3000:NEXT
 1720 FORI%=6 TO 0 STEP-1
 1730 PROCmove_lorry
 1740 NEXT
 1750 ENDPROC
 1760 REM **********************
 1770 DEFPROCchoose
 1780 letter%=1
 1790 COLOUR129:PRINTTAB(4,27)STRING$
(12," "):FORdelay%=1TO5000:NEXT:COLOU
R128:PRINTTAB(4,27)STRING$(12," ")
 1800 RESTORE 1930:READnumber%
 1810 FORI%=1 TO RND(number%)
 1820 READword$
 1830 NEXT
 1840 COLOUR2
 1850 FORflash%=1TO15
 1860 PRINTTAB(4,27)STRING$(12," ")
 1870 FORdelay%=1TO600:NEXT
 1880 PRINTTAB(10-LEN(word$)/2,27)wor
d$
 1890 FORdelay%=1TO600:NEXT
 1900 NEXT
 1910 ENDPROC
 1920 REM **********************
 1930 DATA 35
 1940 DATA cat,dog,cow,sheep,frog
 1950 DATA tree,mat,cup,bell,book
 1960 DATA key,horse,fish,sky,rain
 1970 DATA sun,wind,air,jump,duck
 1980 DATA zebra,up,down,left,right
 1990 DATA hand,foot,head,ear,eye
 2000 DATA nose,mouth,leg,arm,bird
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

ENET-THE BBC HARD DISC NETWORK

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HI-TEC
SHOW
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STAND
117

From Page 124

```
  500 REM************************
  510 DEFPROCscene
  520 PROCwindow(1,0,0,0,134,CHR$12)
  530 PROCwindow(2,0,0,0,132,CHR$12)
  540 PROCwindow(1,oldboatx,10,0,134,
boat$)
  550 GCOL0,2:MOVE 0,672:MOVE 0,772:P
LOT 85,260,672
  560 MOVE 1279,672:MOVE 1279,720:PLO
T 85,1140,672
  570 PROCwindow(2,0,0,7,132,"")
  580 FOR numy=0 TO 17:PRINTTAB(0,num
y);CHR$(numy+97);:NEXT numy
  590 FOR locx=4 TO 18:FOR locy=0 TO
17
  600 PROCputsea(locx,locy,0)
  610 NEXT locy:NEXT locx
  620 PROCwindow(1,0,2,1,134,"Z or X
then Return")
  630 ENDPROC
  640 REM*************************
  650 DEFPROCsubs
  660 FOR tally= 1 TO 20
  670 subx=RND(13)+3:suby=RND(17)
  680 IF FNsea(subx,suby)=1 THEN GOTO
 670
  690 PROCputsea(subx,suby,1)
  700 NEXT tally
  710 ENDPROC
  720 REM**************************
  730 DEFPROCmove_boat
  740 REPEAT
  750 newboatx=oldboatx+INKEY(-98)-IN
KEY(-67)
  760 IF newboatx>16 newboatx=16
  770 IF newboatx<4 newboatx=4
  780 PROCdelay(.5)
  790 *FX19
  800 PROCwindow(1,oldboatx,10,0,134,
"  ")
  810 PROCwindow(1,newboatx,10,0,134,
boat$)
  820 oldboatx=newboatx
  830 UNTIL INKEY(-74)
  840 ENDPROC
  850 REM**************************
  860 DEFPROCinput
  870 *FX21,0
  880 PROCwindow(1,0,2,4,134,"What de
pth Capt'n ? ")
  890 PROCwindow(1,0,6,4,134,"Choose
A - R: ")
  900 REPEAT:guess=GET AND &DF:UNTILg
uess>=65 AND guess<=82
  910 PROCwindow(1,14,6,4,134,CHR$gue
ss)
  920 IF FNsea(newboatx,guess-65)=2 O
R FNsea(newboatx,guess-65)=3 THEN PRO
Cwindow(1,0,2,0,134,"You've tried the
re !"):PROCdelay(2):PRINTTAB(0,4);SPC
(20):PRINTTAB(0,6);SPC(20):GOTO 880
  930 ENDPROC
  940 REM*************************
  950 DEFPROCbomb
  960 PROCwindow(1,0,6,4,134,STRING$(
20," "))
  970 PROCwindow(1,0,6,0,134,"Fire ")
:PRINTTAB(6,6);mines+1
  980 PROCdelay(1)
  990 FOR newbomby= 0 TO guess-65
 1000 SOUND &1,-newbomby,200-(newbomb
y*2),2
 1010 IF newbomby AND (FNsea(newboatx
,newbomby-1)=0 OR FNsea(newboatx,newb
omby-1)=1) PROCwindow(2,newboatx,newb
omby-1,0,132," ")
 1020 IF newbomby AND FNsea(newboatx,
newbomby-1)=2 PROCwindow(2,newboatx,n
ewbomby-1,7,132,"X")
 1030 IF newbomby AND FNsea(newboatx,
newbomby-1)=3 PROCwindow(2,newboatx,n
ewbomby-1,0,132,CHR$227)
 1040 PROCwindow(2,newboatx,newbomby,
0,132,CHR$226)
 1050 NEXT newbomby
 1060 SOUND 1,0,0,0
 1070 mines=mines+1
 1080 ENDPROC
 1090 REM*************************
 1100 DEFPROCcheck
 1110 flagx=0:flagy=0
 1120 IF FNsea(newboatx,guess-65)=1 T
HEN PROCbang:ENDPROC ELSE PROCwindow(
2,newboatx,guess-65,7,132,"X")
 1130 FOR locx=4 TO 13:IF FNsea(locx,
guess-65)=1 THEN flagx=1
 1140 NEXT locx
 1150 FOR depth=0 TO 21:IF FNsea(newb
oatx,depth)=1 THEN flagy=1
 1160 NEXT depth
 1170 IF flagx=1 AND flagy=0 THEN PRO
Cwindow(2,0,19,0,132,"Depth OK, move
boat!")
 1180 IF flagy=1 AND flagx=0 THEN PRO
Cwindow(2,0,19,0,132,"Wrong depth !")
 1190 IF flagy=1 AND flagx=1 THEN PRO
Cwindow(2,0,19,0,132,"Depth/location
OK !")
 1200 PROCdelay(3):PROCputsea(newboat
x,guess-65,2):PROCwindow(2,0,0,0,132,
""):PRINTTAB(0,19);SPC(20);:PROCwindo
w(1,0,0,0,134,""):PRINTTAB(0,2);SPC(2
0):PRINTTAB(0,6);SPC(20)
 1210 ENDPROC
 1220 REM************************
 1230 DEFPROCfinished
 1240 PROCwindow(1,0,0,0,134,CHR$12)
 1250 IF mines>19 PROCwindow(1,0,2,0,
134,"You're out of ammo!")
 1260 IF subs>4 PROCwindow(1,0,2,0,13
4,"That's the lot!")
 1270 PROCdelay(3)
 1280 ENDPROC
 1290 REM************************
 1300 DEFPROCresults
 1310 PROCwindow(1,0,0,0,132,CHR$12)
 1320 PRINTTAB(0,4);"That took ";mine
s;" mines"
 1330 PROCwindow(2,0,0,0,128,CHR$12)
 1340 COLOUR 3:PRINTTAB(0,11);"And yo
u had "subs" subs"
 1350 PROCwindow(2,0,15,3,128,"Try ag
ain Y/N")
 1360 REPEAT A=GET AND &DF:UNTIL A=89
 OR A=78
 1370 IF A<>89 THEN END
 1380 ENDPROC
 1390 REM************************
 1400 DEFPROCwindow(w,sx,sy,fcol,bcol
,A$)
 1410 COLOUR fcol:COLOUR bcol
 1420 IF w=1 THEN VDU28,0,10,19,0
 1430 IF w=2 THEN VDU28,0,31,19,11
 1440 PRINTTAB(sx,sy);A$;
 1450 ENDPROC
 1460 REM************************
 1470 DEFPROCdelay(number)
 1480 FOR delay=1 TO number*1000
 1490 NEXT delay
 1500 ENDPROC
 1510 REM***********************
 1520 DEFPROCbang
 1530 SOUND &10,-10,6,20:PROCwindow(2
,newboatx,guess-65,0,132,CHR$228):PRO
Cdelay(2):PROCwindow(2,newboatx,guess
-65,0,132,CHR$227)
 1540 PROCputsea(newboatx,guess-65,3)
:subs=subs+1:PROCwindow(1,0,0,0,134,"
"):PRINTTAB(0,2);SPC(20):PRINTTAB(0,6
);SPC(20)
 1550 ENDPROC
 1560 REM***********************
 1570 DEF FNsea(x,y)
 1580 =?(sea+20*y+x)
 1590 REM***********************
 1600 DEFPROCputsea(x,y,n)
 1610 ?(sea+20*y+x)=n
 1620 ENDPROC
 1630 REM*****MUSIC DATA*******
 1640 DATA 53,61,69,73,81,89,97,101
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

PRACTICAL PROGRAMS TO . . .

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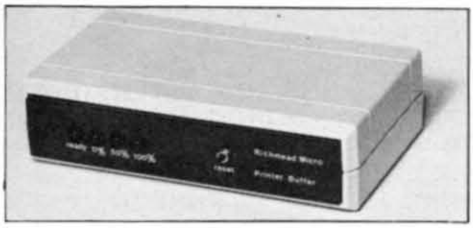
CD **CARSON DEVELOPMENTS (MU)**
84 Highfield Road, Romford, Essex RM5 3RU
Telephone: 0708 27043

From Page 52

```
 10 REM Event driven memory dump
 20 REM By Kevin Edwards
 30 REM
 40 org=&C00
 50 bytes_per_row=8
 60 rows_displayed=6
 70 screen=&70      :REM 2 bytes
 80 char_data=&72  :REM 2 bytes
 90 temp_y=&74      :REM 1 byte
100 row_addr=&75   :REM 2 bytes
110 row_count=&77  :REM 1 byte
120 old_start=&78  :REM 2 bytes
130 sync_count=&7A :REM 1 byte
140 scn_base=&34E
150 scn_start=&350
160 row_size=&352
170 scn_size=&354
180 num_colours=&360
190 mem_start=&404 :REM A%
200 str_buff=&780
210 oscli=&FFF7
220 FORpass=0 TO 2 STEP 2
230 P%=org
240 [OPT pass
250 .sync
260 PHP
270 CMP#4:BNEexit2
280 PHA:TXA:PHA:TYA:PHA
290 LDAnum_colours
300 CMP#1:BNEexit
310 INCsync_count
320 LDA#3:BITsync_count
330 BNEexit
340 LDAscn_start:STAscreen
350 STAold_start
360 LDAscn_start+1:STAscreen+1
370 STAold_start+1
380 LDAmem_start+1:STArow_addr+1
390 LDAmem_start:STArow_addr
400 LDA#rows_displayed:STArow_count
410 .row_loop
420 JSRprint_row
430 DECrow_count
440 BNErow_loop
450 .exit
460 PLA:TAY:PLA:TAX:PLA
470 .exit2
480 PLP:RTS
490 .print_row
500 LDArow_addr+1:JSRhex_print
510 LDArow_addr:JSRhex_print
520 JSRprint_space
530 LDY#0:LDX#bytes_per_row
540 .next_address
550 LDA(row_addr),Y
560 INY
570 STYtemp_y
580 JSRhex_print
590 JSRprint_space
600 LDYtemp_y
610 DEX:BNEnext_address
620 LDY#0:LDX#bytes_per_row
630 .asc_print
640 LDA(row_addr),Y
650 CMP#ASC" ":BCCctrl_char
660 CMP#ASC"~"+1:BCCdisp_char
670 .ctrl_char
680 LDA#ASC"."
690 .disp_char
700 SEC:SBC#ASC" "
710 INY:STYtemp_y
720 JSRchar_entry
730 LDYtemp_y
740 DEX:BNEasc_print
750 LDArow_addr:CLC:ADC#bytes_per_r
ow
760 STArow_addr:BCCskip2
770 INCrow_addr+1
780 .skip2
790 LDAold_start
800 CLC:ADCrow_size
810 STAscreen:STAold_start
820 LDAold_start+1
830 ADCrow_size+1
840 BPLno_wrap
850 SEC;SBCscn_size
860 .no_wrap
870 STAscreen+1:STAold_start+1
880 RTS
890 .print_space
900 LDA#0:STAchar_data
910 LDA#&C0:STAchar_data+1
920 JMPspc_entry
930 .hex_print
940 PHA:LSRA:LSRA:LSRA:LSRA
950 JSRdisplay_hex_char
 960 PLA:AND#&F
 970 .display_hex_char
 980 CMP#&A:BCCten
 990 ADC#6
1000 .ten
1010 ADC#ASC"0"-ASC" "
1020 .char_entry
1030 LDY#&18:STYchar_data+1
1040 ASLA:ROLchar_data+1
1050 ASLA:ROLchar_data+1
1060 ASLA:ROLchar_data+1
1070 STAchar_data
1080 .spc_entry
1090 LDY#7
1100 .loop1
1110 LDA(char_data),Y
1120 STA(screen),Y
1130 DEY:BPLloop1
1140 .add_8
1150 LDAscreen:CLC:ADC#8
1160 STAscreen:BCCskip
1170 INCscreen+1:BPLskip
1180 LDAscn_base:STAscreen+1
1190 .skip
1200 RTS
1210 .setup
1220 SEI
1230 LDA#sync MOD 256:STA&220
1240 LDA#sync DIV 256:STA&221
1250 CLI:RTS
1260 ]NEXT
1270 $str_buff="SAVE DUMPER "+STR$~(
org)+" "+STR$~(P%)+" "+STR$~(setup)
1280 X%=str_buff MOD 256
1290 Y%=str_buff DIV 256
1300 CALLoscli
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

PRINTER BUFFER FOR BBC MICRO



This is a professional quality printer buffer available in 2 sizes. The 64k version will hold about 15 A4 pages, while the 256k version will hold a massive 60 A4 pages of text. No software to worry about – just plug in and go. Ideal for word-processing, programming, or any other application involving a significant amount of printer time. Powered from the BBC's auxiliary power socket. Parallel printer interface only.

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256k printer buffer	**£145.00 + VAT**

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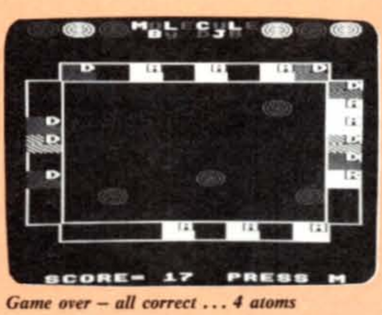
From Page 103

```
   10 REM- MOLECULE / A solo game
   20 REM- ----------------------
   30 REM- by Daniel J. Bishop
   40 REM- -------------------
   50 REM- (c) The Micro User
   60 REM- Runs on BBC Micro Model B
   70 REM- with or witKout discs
   80 REM- and Acorn Electron
   90 REM-
  100 DATA 0,1,1,0,1,2,0,1,3,1,1,1,1,
1,2,1,1,3,1,2,2,1,2,3,1,3,3,0,2,3,2,2
,3,3,3,2
  110 MODE 5:VDU 19,2,7,0,0,0,19,3,4,
0,0,0,23;8202;0;0;0;
  120 VDU 23,224,0,7,24,35,44,73,82,8
5
  130 VDU 23,225,0,224,24,196,52,146,
74,170
  140 VDU 23,226,85,82,73,44,35,24,7,
0
  150 VDU 23,227,170,74,146,52,196,24
,224,0
  160 VDU 23,228,146,73,36,146,73,36,
146,73
  170 VDU 23,229,73,36,146,73,36,146,
73,36
  180 VDU 23,230,36,146,73,36,146,73,
36,146
  190 VDU 23,231,255,255,255,255,255,
255,255,255
  200 DIM GRID%(9,9),ATOM%(9,9),COL%(
12,2)
  210 FOR L0%=1 TO 12:FOR L1%=0 TO 2:
READ COL%(L0%,L1%):NEXT:NEXT
  220 ATOM%=3
  230 ATOM$=CHR$(224)+CHR$(225)+CHR$(
10)+CHR$(8)+CHR$(8)+CHR$(226)+CHR$(22
7)
  240 AB$=CHR$(231)+"A"+CHR$(10)+CHR$
(8)+CHR$(8)+CHR$(231)+CHR$(231)
  250 REFLECT$=CHR$(231)+"R"+CHR$(10)
+CHR$(8)+CHR$(8)+CHR$(231)+CHR$(231)
  260 RAND%=FALSE
  270 *FX4,1
  280 FOR L0%=0 TO 9:FOR L1%=0 TO 9:A
TOM%(L0%,L1%)=0:GRID%(L0%,L1%)=0:NEXT
:NEXT
  290 IF RAND% THEN ATOM%=RND(3)+2
  300 FOR L0%=1 TO ATOM%
  310 N0%=RND(8):N1%=RND(8)
  320 IF NOT ATOM%(N0%,N1%) THEN ATOM
%(N0%,N1%)=TRUE ELSE 310
  330 NEXT
  340 CURSX%=1:CURSY%=0:SCORE%=0:DFL%
=0
  350 PROCscreendisplay
  360 *FX15,0
  370 PROCcursor
  380 USER$=GET$
  390 PROCcursor
  400 IF USER$="I" OR USER$="i" THEN
MODE 6:PROCinstructions:MODE 5:VDU 19
,2,7,0,0,0,19,3,4,0,0,0,23;8202;0;0;0
;:PROCscreendisplay:GOTO 360
  410 IF USER$="M" OR USER$="m" THEN
PROCmolecule:GOTO 280
  420 IF INSTR("345Rr",USER$)>0 THEN
PROCnewgame:GOTO 280
  430 N0%=ASC(USER$)-135:IF N0%>=1 AN
D N0%<=4 THEN PROCmove(N0%):GOTO 360
  440 IF USER$<>"Z" AND USER$<>"z" TH
EN 360
  450 IF (CURSX%=0 OR CURSX%=9 OR CUR
SY%=0 OR CURSY%=9) AND DFL%<12 THEN P
ROCray:GOTO 360
  460 IF NOT (CURSX%=0 OR CURSX%=9 OR
 CURSY%=0 OR CURSY%=9) THEN PROCatom:
GOTO 360
  470 GOTO 360
  480 DEF PROCscreendisplay
  490 CLS:PRINT:N0%=0:FOR L0%=0 TO 2:
COLOUR N0%+1:PRINT ATOM$+CHR$(11);:N0
%=(N0%+1) MOD 2:NEXT
  500 FOR L0%=0 TO 7:COLOUR N0%+1:PRI
NT MID$("MOLECULE",L0%+1,1);:N0%=(N0%
+1) MOD 2:NEXT
  510 FOR L0%=0 TO 2:COLOUR N0%+1:PRI
NT ATOM$+CHR$(11);:N0%=(N0%+1) MOD 2:
NEXT
  520 VDU 31,7,2:FOR L0%=0 TO 5:N0%=(
N0%+1) MOD 2:COLOUR N0%+1:PRINT MID$(
"??????",L0%+1,1);:NEXT
  530 GCOL 0,2:MOVE 126,832:DRAW 1152
,832:MOVE 128,766:DRAW 1150,766:MOVE
128,258:DRAW 1150,258:MOVE 126,188:DR
AW 1152,188
  540 MOVE 126,192:DRAW 126,252:MOVE
128,258:DRAW 128,766:MOVE 126,768:DRA
W 126,832
  550 MOVE 1152,188:DRAW 1152,252:MOV
E 1150,258:DRAW 1150,766:MOVE 1152,76
8:DRAW 1152,832
  560 MOVE 0,768:DRAW 126,768:MOVE 11
52,768:DRAW 1279,768:MOVE 0,252:DRAW
126,252:MOVE 1152,252:DRAW 1279,252
  570 MOVE 0,252:DRAW 0,768:MOVE 1279
,252:DRAW 1279,768:VDU 31,0,30:FOR L0
%=0 TO 18 STEP 3:N0%=(N0%+1) MOD 2:CO
LOUR N0%+1:PRINT MID$("3  4  5  R   I
  Z  M",L0%+1,3);:NEXT
  580 FOR L0%=0 TO 9:FOR L1%=0 TO 9
  590 MOVE L0%*128,828-L1%*64:GCOL 0,
2
  600 IF GRID%(L0%,L1%)=FALSE THEN 65
0
  610 IF GRID%(L0%,L1%)=TRUE THEN VDU
 5:PRINT ATOM$;:VDU 4:GOTO 650
  620 IF GRID%(L0%,L1%)=13 THEN VDU 5
:PRINT AB$;:VDU 4:GOTO 650
  630 IF GRID%(L0%,L1%)=14 THEN VDU 5
:PRINT REFLECT$;:VDU 4:GOTO 650
  640 PROCdeflect(GRID%(L0%,L1%))
  650 NEXT:NEXT
  660 ENDPROC
  670 DEF PROCcursor
  680 MOVE CURSX%*128-8,832-CURSY%*64
:PLOT 10,140,0:PLOT 10,0,-65:PLOT 10,
-140,0:PLOT 10,0,65
  690 ENDPROC
  700 DEF PROCmolecule
  710 GCOL 0,1:VDU 5:N0%=0:N1%=0:FOR
L0%=1 TO 8:FOR L1%=1 TO 8
  720 IF GRID%(L0%,L1%) AND ATOM%(L0%
,L1%) THEN N1%=N1%+1
  730 IF ATOM%(L0%,L1%) THEN MOVE 128
*L0%,828-L1%*64:PRINT ATOM$
  740 IF GRID%(L0%,L1%) THEN N0%=N0%+
1
  750 NEXT:NEXT
  760 VDU 4
  770 IF ATOM%>N0% THEN N0%=ATOM%
  780 SCORE%=SCORE%+5*(N0%-N1%)
  790 VDU 31,0,30:COLOUR 2:PRINT " SC
ORE=";RIGHT$("   "+STR$(SCORE%),3);SP
C(2);"PRESS M ";
  800 *FX15,0
  810 REPEAT:S0$=GET$:UNTIL S0$="M" O
R S0$="m"
  820 ENDPROC
  830 DEF PROCnewgame
  840 N0%=VAL(USER$)
  850 IF N0%=0 THEN RAND%=TRUE ELSE A
TOM%=N0%:RAND%=FALSE
  860 ENDPROC
  870 DEF PROCmove(N0%)
  880 ON N0% GOTO 970,1010,930,890
  890 CURSY%=CURSY%-1
  900 IF CURSY%=-1 THEN CURSY%=9
  910 IF CURSY%=0 AND (CURSX%=0 OR CU
RSX%=9) THEN CURSY%=8
  920 GOTO 1040
  930 CURSY%=CURSY%+1
  940 IF CURSY%=10 THEN CURSY%=0
  950 IF CURSY%=9 AND (CURSX%=0 OR CU
RSX%=9) THEN CURSY%=1
  960 GOTO 1040
  970 CURSX%=CURSX%-1
  980 IF CURSX%=-1 THEN CURSX%=9
  990 IF CURSX%=0 AND (CURSY%=0 OR CU
RSY%=9) THEN CURSX%=8
 1000 GOTO 1040
 1010 CURSX%=CURSX%+1
 1020 IF CURSX%=10 THEN CURSX%=0
 1030 IF CURSX%=9 AND (CURSY%=0 OR CU
RSY%=9) THEN CURSX%=1
 1040 ENDPROC
 1050 DEF PROCray
 1060 IF CURSY%=9 THEN N0%=0:N1%=-1
 1070 IF CURSX%=9 THEN N0%=-1:N1%=0
 1080 IF CURSY%=0 THEN N0%=0:N1%=1
 1090 IF CURSX%=0 THEN N0%=1:N1%=0
 1100 S0$="":N2%=CURSX%:N3%=CURSY%:N4
%=TRUE
 1110 REPEAT
 1120 N2%=N2%+N0%:N3%=N3%+N1%
 1130 IF N2%=0 OR N2%=9 OR N3%=0 OR N
3%=9 THEN N4%=FALSE:GOTO 1240
 1140 IF ATOM%(N2%,N3%) THEN S0$=AB$:
N4%=FALSE:GOTO 1240
 1150 IF ATOM%(N2%+N1%,N3%+N0%) OR AT
OM%(N2%-N1%,N3%-N0%) THEN N0%=-N0%:N1
%=-N1%:GOTO 1240
 1160 IF ATOM%(N2%+N0%,N3%+N1%) THEN
S0$=AB$:N4%=FALSE:GOTO 1240
 1170 IF ATOM%(N2%+N0%+N1%,N3%+N0%+N1
%) AND ATOM%(N2%+N0%-N1%,N3%-N0%+N1%)
 THEN N0%=-N0%:N1%=-N1%:GOTO 1240
 1180 IF ATOM%(N2%+N0%+N1%,N3%+N0%+N1
%) AND NOT ATOM%(N2%+N0%-N1%,N3%-N0%+
N1%) THEN N5%=N0%:N0%=N1%:N1%=N5% ELS
E 1220
 1190 N1%=-N1%
 1200 IF N5%=0 THEN N0%=-N0%
 1210 GOTO 1240
 1220 IF (NOT ATOM%(N2%+N0%+N1%,N3%+N
0%+N1%)) AND ATOM%(N2%+N0%-N1%,N3%-N0
%+N1%) THEN N5%=N0%:N0%=N1%:N1%=N5% E
LSE 1240
 1230 IF N1%=-1 AND N5%=1 THEN N1%=1
 1240 UNTIL N4%=FALSE
 1250 MOVE CURSX%*128,828-CURSY%*64:G
COL 0,2
 1260 IF S0$=AB$ THEN VDU 5:PRINT AB$
:VDU 4:GRID%(CURSX%,CURSY%)=13:SCORE%
=SCORE%+1:GOTO 1320
 1270 IF N2%=CURSX% AND N3%=CURSY% TH
EN VDU 5:PRINT REFLECT$:VDU 4:GRID%(C
URSX%,CURSY%)=14:SCORE%=SCORE%+1:GOTO
 1320
 1280 DFL%=DFL%+1
 1290 PROCdeflect(DFL%)
 1300 MOVE N2%*128,828-N3%*64:PROCdef
lect(DFL%)
 1310 GRID%(CURSX%,CURSY%)=DFL%:GRID%
(N2%,N3%)=DFL%:SCORE%=SCORE%+2
 1320 ENDPROC
 1330 DEF PROCatom
 1340 MOVE CURSX%*126,828-CURSY%*64
```



Game over – all correct . . . 4 atoms

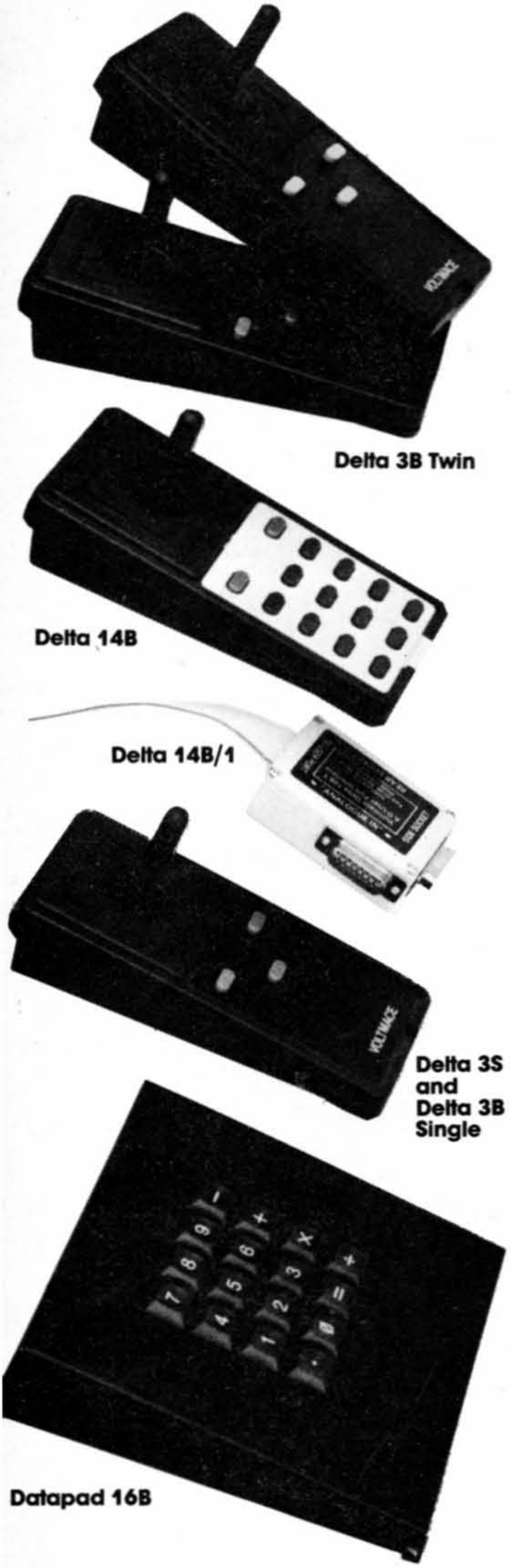
```
 1350 IF GRID%(CURSX%,CURSY%)=FALSE T
HEN GRID%(CURSX%,CURSY%)=TRUE:GCOL 0,
2 ELSE GRID%(CURSX%,CURSY%)=FALSE:GCO
L 0,0
 1360 VDU 5:PRINT ATOM$:VDU 4
 1370 ENDPROC
 1380 DEF PROCinstructions
 1390 PRINT 'TAB(13)"M O L E C U L E"
'TAB(14)"Instructions"
 1400 PRINT ''"The object of the game
 is to deduce the"'"positions of atom
s in a randomly"'"produced molecule.
 The molecule lies"
 1410 PRINT "within the chamber but c
an not be seen"'"until the end of the
 game.  You may"'"deduce the position
s of the atoms by"
 1420 PRINT "firing rays into the cha
mber."''"To fire rays, move the curso
r"'"outside the chamber and press Z.
 Note"'"that the cursor is moved by u
sing the"'"cursor keys."
 1430 PRINT '"Markers will indicate t
he result."'"White A markers show abs
orption."'"White R markers show refle
ction."'"Coloured pairs of D markers
show"
 1440 PRINT "deflection."
 1450 PROCwait
 1460 PRINT "Try and deduce the posit
ions of all the"'"atoms with as few r
ays as possible."'"(Note that a maxim
um of 12 deflections"'"are allowed be
fore you must guess the"'"atomic loca
tions)"
 1470 PRINT '"You may place white ato
m markers in the"
 1480 PRINT "chamber to help you iden
tify the atomic"'"locations.  To do t
his, move the cursor"'"into the chamb
er and press Z."
 1490 PROCwait
 1500 PRINT '"When you believe you ha
ve located all"'"the atoms and have m
arked their"'"positions, press M for
molecule!"
```

```
 1510 PRINT '"The actual positions of
 the atoms will"'"then be revealed.
They are shown by"'"red atom markers.
"''"You will be given your score, whi
ch is"
 1520 PRINT "1 point for every marker
 and 5 points"'"for every atom missin
g, extra, or in"'"the wrong position.
  You must try for"
 1530 PRINT "as low a score as possib
le."
 1540 PROCwait
 1550 PRINT "Whenever 3,4,5 or R are
pressed, all"'"molecules thereafter h
ave 3,4,5 or a"'"random number of ato
ms."
 1560 PRINT '"The easiest game is 3 a
nd the most"'"difficult R.  The compu
ter always"'"selects 3 to start with.
"

 1570 PROCwait
 1580 ENDPROC
 1590 DEF PROCwait
 1600 *FX15,0
 1610 PRINT 'TAB(6)"< Press any key t
o continue >";
 1620 S0$=GET$
 1630 CLS:PRINT
 1640 ENDPROC
 1650 DEF PROCdeflect(N0%)
 1660 LOCAL L0%
 1670 GCOL 0,2:VDU 5:PRINT " D";CHR$(
8);CHR$(8);
 1680 FOR L0%=0 TO 2
 1690 GCOL 0,COL%(N0%,L0%):PRINT CHR$
(228+L0%);CHR$(8);CHR$(10);CHR$(228+L
0%);CHR$(228+L0%);CHR$(8);CHR$(8);CHR
$(11);
 1700 NEXT
 1710 VDU 4
 1720 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

JOYSTICKS— THE COMPLETE SOLUTION



Delta 3B Twin

Delta 14B

Delta 14B/1

Delta 3S and Delta 3B Single

Datapad 16B

DELTA 3B TWIN—BBC B or ELECTRON PLUS 1 £19.95
A direct but improved alternative for the original ACORN joysticks, with 2 joysticks wired to one plug. As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

DELTA 3B SINGLE—BBC B or ELECTRON PLUS 1 £12.00
A single joystick that in some ways can act as two. The custom made special "low noise" potentiometers are wired so that it will work as a left hand or right hand joystick. It can even run some programs written for two joysticks and has the fire buttons of both.

DELTA 14B—BBC B £14.95
Our original ACORN/BBC handset. The same super light joystick, but the long life buttons, which have been video game tested for many years, increased to 14 in number. A DELTA 14B/1 is needed to run the keypad but a 14B on its own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA 14B/1 for use with 1 or 2 DELTA 14Bs £14.85
DELTA DRIVER CASSETTE £5.95
The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

DELTA 3S—ELECTRON with switch joystick interface £12.00
For an ELECTRON with a switched joystick interface (Not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

DELTA ASC not illustrated **£9.95**
This little box plugs in series with your analogue joystick to alter its characteristics simply by using a switch. In one set up the joystick will act like a switched joystick, i.e. a slight movement will act as if the joystick has been pushed hard over. In the other mode the joystick only covers the centre half of the A/D converter so that it takes twice as much movement to give the same effect. This makes it much easier to make delicate adjustments to programs like flight simulators.

DATAPAD 16B £39.95
A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

Access

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VARIABLES

posX%(1),posY%(1)	Hold the X and Y coordinates of the selected dots.
dot%(1)	Holds dot numbers of the selected dots.
side%(64,3)	Remembers whether a line going in one of four directions (0-3) starting at a particular dot, has been set.
score%(1)	Holds score of both players.
plyr%	Whose go it is.
n_player%	Whether one or two player game is being played.
blind$	Whether blind or normal version is being played.
blind%	Holds the number of times the blind key has been pressed during blind version.
X%,Y%,X2%,Y2%	Hold X and Y coordinates of cross when dots are being chosen during PROCchoose_line.
x%,y%,x2%,y2%	Hold calculated coordinates of the computer's two chosen dots.
save%,look%,look2%	Used during the computer's go to remember the number of lines set on the two adjacent squares to the computer's best move.
D%	Holds direction of the line the computer is looking at.
num%	Holds number of dots per side on the board.
i_board%,board%	Hold the size of the surround to the board.

From Page 117

```
   10REM     SQUARES
   20REM    MARK WARD
   30REM (C) The Micro User
   40DIMposX%(1):DIMposY%(1):DIMside%
(64,3):DIMdot%(1):DIMscore%(1)
   50MODE7
   60PROCsize
   70PROCinit
   80MODE2
   90PROCboard
  100REPEAT
  110REPEAT
  120plyr%=0
  130PROCchoose_line
  140PROCtest_sq
  150IF (score%(0)+score%(1))-blind%=
(num%^2)*10 GOTO240
  160UNTILtest=FALSE
  170REPEAT
  180plyr%=1
  190IF n_player%=1PROCauto ELSE PROC
choose_line
  200PROCtest_sq
  210IF (score%(0)+score%(1))-blind%=
(num%^2)*10 GOTO240
  220UNTILtest=FALSE
  230UNTILFALSE
  240FORN%=0TO10000:NEXT
  250MODE7
  260PROCfin
  270IF LEFT$(GO$,1)="Y" OR LEFT$(GO$
,1)="y"GOTO50
  280END
  290DEFPROCchoose_line
  300*FX21,0
  310VDU4
  320COLOUR1
  330PRINTTAB(12*(plyr%),1);"PLAYER "
;plyr%+1
  340VDU5
  350GCOL3,2
  360X2%=611:Y2%=449
  370FORN%=0TO1
  380REPEAT
  390X%=X2%:Y%=Y2%
  400MOVEX%-(num%*36),Y%-(num%*32):PR
INT"+"
  410G=GET
  420IF G=66 AND blind$="Y"ORblind$="
y" VDU19,11,5;0;:FORM%=1TO4000:NEXT:V
DU19,11,11;0;:PROCscore(plyr%+1MOD2):
blind%=blind%+10
  430IF G<135 OR G>139 GOTO410
  440IF G=136 X2%=X2%-72:IF X2%<611 X
2%=611+(num%*72)
  450IF G=137 X2%=X2%+72:IF X2%>(611+
(num%*72)) X2%=611
  460IF G=138 Y2%=Y2%-64:IF Y2%<449 Y
2%=449+(num%*64)
  470IF G=139 Y2%=Y2%+64:IF Y2%>(449+
(num%*64)) Y2%=449
  480MOVEX%-(num%*36),Y%-(num%*32):PR
INT"+"
  490UNTILG=135
  500posX%(N%)=X2%+27-(num%*36)
  510posY%(N%)=Y2%-13-(num%*32)
  520NEXTN%
  530IF (posX%(1)-posX%(0))+(posY%(1)
-posY%(0))>72 OR (posX%(1)-posX%(0))+
(posY%(1)-posY%(0))<-72 VDU7:GOTO370
  540IF (posX%(1)=posX%(0)) AND (posY
%(1)=posY%(0)) VDU7:GOTO370
  550FORM%=0TO1
  560dot%(M%)=((posX%(M%)-638+(num%*3
6))/72)+(num%+1)*(posY%(M%)-436+(num%
*32))/64
  570NEXTM%
  580IF dot%(1)-dot%(0)=-1 direct%=0
  590IF dot%(1)-dot%(0)=num%+1 direct
%=1
  600IF dot%(1)-dot%(0)=1 direct%=2
  610IF dot%(1)-dot%(0)=-num%-1 direc
t%=3
  620IF side%(dot%(0),direct%)=1 VDU7
:GOTO370
  630GCOL3,6
  640MOVEposX%(0),posY%(0):DRAWposX%(
1),posY%(1)
  650IF blind$="Y" OR blind$="y" GCOL
3,14:FORB%=0TO10000:NEXT:MOVEposX%(0)
,posY%(0):DRAWposX%(1),posY%(1)
  660side%(dot%(0),direct%)=1
  670side%(dot%(1),(direct%+2)MOD4)=1
  680VDU4
  690COLOUR4
  700PRINTTAB(12*(plyr%),1);"PLAYER "
;plyr%+1
  710VDU5
  720ENDPROC
  730DEFPROCauto
  740VDU4
  750COLOUR1
  760PRINTTAB(12,1);"PLAYER 2"
  770VDU5
  780save%=7
  790L%=((num%+1)^2)-2
```

→

From Page 175

```
800FORN%=0TOL%
810FORD%=1TO2
820IF D%=2 AND (N%+1)MOD(num%+1)=0
GOTO870
830IF D%=1 AND N%>(((num%+1)^2)-num
%-2) GOTO870
840IF side%(N%,D%)=1 GOTO870
850look%=0:look2%=0
860PROCaut_side
870NEXTD%:NEXTN%
880IF direct%=2 dot%(1)=dot%(0)+1
890IF direct%=1 dot%(1)=dot%(0)+num
%+1
900GCOL3,6
910x%=638-(num%*36)+(72*(dot%(0)MOD
(num%+1)))
920y%=436-(num%*32)+(64*(dot%(0)DIV
(num%+1)))
930x2%=638-(num%*36)+(72*(dot%(1)MO
D(num%+1)))
940y2%=436-(num%*32)+(64*(dot%(1)DI
V(num%+1)))
950SOUND1,-15,200,2
960FORN%=1TO5
970MOVEx%,y%
980PLOT5,x2%,y2%
990FORM%=0TO1000:NEXT
1000NEXTN%
1010IF blind$="Y" OR blind$="y" GCOL
3,14:MOVEx%,y%:PLOT5,x2%,y2%
1020side%(dot%(0),direct%)=1
1030side%(dot%(1),(direct%+2)MOD4)=1
1040VDU4
1050COLOUR4
1060PRINTTAB(12,1);"PLAYER 2"
1070VDU5
1080ENDPROC
1090DEFPROCaut_side
1100IF D%=2 GOTO1170
1110IF N%MOD(num%+1)=0 GOTO1140
1120look%=side%(N%+num%+1,0)+side%(N
%+num%,3)+side%(N%-1,2)
1130IF (N%+1)MOD(num%+1)=0 GOTO1150
1140look2%=side%(N%+num%+1,2)+side%(
N%+2+num%,3)+side%(N%+1,0)
1150PROCaut_cho
1160ENDPROC
1170IF N%<num%+1 GOTO1200
1180look%=side%(N%+1,3)+side%(N%-num
%,0)+side%(N%-num%-1,1)
1190IF N%>(((num%+1)^2)-num%-3) GOTO
1210
1200look2%=side%(N%+1,1)+side%(N%+2+
num%,0)+side%(N%+num%+1,3)
1210PROCaut_cho
1220ENDPROC
1230DEFPROCaut_cho
1240IF look%=3 OR look2%=3 dot%(0)=N
%:direct%=D%:N%=L%:D%=2:ENDPROC
1250IF look%=2ANDlook2%=0 OR look%=0
ANDlook2%=2 look%=look%+1
1260IF look%+look2%<save% save%=look
%+look2%:dot%(0)=N%:direct%=D%:ENDPRO
C
1270IF look%+look2%=save% AND RND(N%
+1)=1 save%=look%+look2%:dot%(0)=N%:d
irect%=D%
1280ENDPROC
1290DEFPROCtest_sq
1300test=FALSE
1310ONdirect%+1GOSUB1330,1380,1430,1
480
1320GOTO1530
1330IF dot%(0)<num%+1 GOTO1360
1340IF side%(dot%(0)-1,3)=1 AND side
%(dot%(0)-2-num%,2)=1 AND side%(dot%(
0)-num%-1,1)=1 PROCsquare(dot%(0),dot
%(0)-1,dot%(0)-num%-1,dot%(0)-2-num%)
1350IF dot%(0)>(num%+1)^2-num%-2 GOT
01370
1360IF side%(dot%(0)-1,1)=1 AND side
%(dot%(0)+num%,2)=1 AND side%(dot%(0)
+num%+1,3)=1 PROCsquare(dot%(0)+num%+
1,dot%(0)+num%,dot%(0),dot%(0)-1)
1370RETURN
1380IF dot%(0)MOD(num%+1)=0 GOTO1410
1390IF side%(dot%(0)+num%+1,0)=1 AND
 side%(dot%(0)+num%,3)=1 AND side%(do
t%(0)-1,2)=1 PROCsquare(dot%(0)+num%+
1,dot%(0)+num%,dot%(0),dot%(0)-1)
1400IF (dot%(0)+1)MOD(num%+1)=0 GOTO
1420
1410IF side%(dot%(0)+num%+1,2)=1 AND
 side%(dot%(0)+2+num%,3)=1 AND side%(
dot%(0)+1,0)=1 PROCsquare(dot%(0)+2+n
um%,dot%(0)+num%+1,dot%(0)+1,dot%(0))
1420RETURN
1430IF dot%(0)<num%+1 GOTO1460
1440IF side%(dot%(0)+1,3)=1 AND side
%(dot%(0)-num%,0)=1 AND side%(dot%(0)
-num%-1,1)=1 PROCsquare(dot%(0)+1,dot
%(0),dot%(0)-num%,dot%(0)-num%-1)
1450IF dot%(0)>(num%+1)^2-num%-3 GOT
01470
1460IF side%(dot%(0)+1,1)=1 AND side
%(dot%(0)+2+num%,0)=1 AND side%(dot%(
0)+num%+1,3)=1 PROCsquare(dot%(0)+2+n
um%,dot%(0)+num%+1,dot%(0)+1,dot%(0))
1470RETURN
1480IF dot%(0)MOD(num%+1)=0 GOTO1510
1490IF side%(dot%(0)-num%-1,0)=1 AND
 side%(dot%(0)-num%-2,1)=1 AND side%(
dot%(0)-1,2)=1 PROCsquare(dot%(0),dot
%(0)-1,dot%(0)-num%-1,dot%(0)-2-num%)
1500IF (dot%(0)+1)MOD(num%+1)=0 GOTO
1520
1510IF side%(dot%(0)-num%-1,2)=1 AND
 side%(dot%(0)-num%,1)=1 AND side%(do
t%(0)+1,0)=1 PROCsquare(dot%(0)+1,dot
%(0),dot%(0)-num%,dot%(0)-num%-1)
1520RETURN
1530ENDPROC
1540DEFPROCsquare(a%,b%,c%,d%)
1550test=TRUE
1560GCOL0,plyr%*4+2
1570X%=630-(num%*36)+72*(a%MOD(num%+
1))
1580Y%=432-(num%*32)+64*(a%DIV(num%+
1))
1590MOVEX%,Y%
1600X%=646-(num%*36)+72*(b%MOD(num%+
1))
1610Y%=432-(num%*32)+64*(b%DIV(num%+
1))
1620MOVEX%,Y%
1630X%=630-(num%*36)+(72*(c%MOD(num%
+1)))
1640Y%=440-(num%*32)+64*(c%DIV(num%+
1))
1650PLOT85,X%,Y%
1660X%=646-(num%*36)+72*(d%MOD(num%+
1))
1670Y%=440-(num%*32)+64*(d%DIV(num%+
1))
1680PLOT85,X%,Y%
1690PROCscore(plyr%)
1700ENDPROC
1710DEFPROCscore(A%)
1720VDU4
1730COLOUR7
1740score%(A%)=score%(A%)+10
1750PRINTTAB((A%*12)+3,3);score%(A%)
1760VDU5
1770ENDPROC
1780DEFPROCfin
1790PROCpage
1800PRINTTAB(6,10)"Player1 Scored ";
score%(0);" Points"
1810PRINTTAB(6,12)"Player2 Scored ";
score%(1);" Points"
1820INPUTTAB(12,18)"Another Go(Y/N)"
GO$
1830ENDPROC
1840DEFPROCsize
1850PROCpage
1860PRINTTAB(3,8);"Do you want the o
ne player or the";SPC(13);"two player
 game(1-2)?"
1870n_player%=GET-48
1880IF n_player%<1 OR n_player%>2 GO
TO1860
1890PRINTTAB(5,13);"How many squares
 do you want"SPC(19)"per side(4-7)?"
1900num%=GET-48
1910IF num%<4 OR num%>7 GOTO1900
```

```
 1920PRINTTAB(4,19);"Do you wish to p
lay blind(Y/N)?"
 1930blind$=GET$
 1940IF blind$<>"Y" AND blind$<>"y" A
ND blind$<>"N" AND blind$<>"n" GOTO19
30
 1950ENDPROC
 1960DEFPROCpage
 1970VDU23;8202;0;0;0;
 1980PRINTTAB(0,0);CHR$(131);CHR$(157
);CHR$(141);CHR$(132);TAB(16,0);"SQUA
RES"
 1990PRINTTAB(0,1);CHR$(131);CHR$(157
);CHR$(141);CHR$(132);TAB(16,1);"SQUA
RES"
 2000PRINTTAB(0,2);CHR$(129);CHR$(157
)
 2010ENDPROC
 2020DEFPROCinit
 2030*FX4,1
 2040*FX9,0
 2050VDU23,225,170,85,170,85,170,85,1
70,85
 2060score%(0)=0:score%(1)=0
 2070blind%=0
 2080FORN%=0TO(num%+1)^2
 2090FORM%=0TO3
 2100side%(N%,M%)=0
 2110NEXT:NEXT
 2120ENDPROC
 2130DEFPROCboard
 2140VDU23;8202;0;0;0;
 2150COLOUR130:CLS
 2160GCOL0,4
 2170board%=(num%+4):i_board%=(num%+2
)
 2180MOVE638+(board%*36),436-(board%*
32):PLOT5,638+(board%*36),436+(board%
*32):PLOT85,638-(board%*36),436-(boar
d%*32):PLOT85,638-(board%*36),436+(bo
ard%*32)
 2190GCOL0,3
 2200MOVE638+(i_board%*36),436-(i_boa
rd%*32):PLOT5,638+(i_board%*36),436+(
i_board%*32):PLOT85,638-(i_board%*36)
,436-(i_board%*32):PLOT85,638-(i_boar
d%*36),436+(i_board%*32)
 2210GCOL0,0
 2220MOVE638+(i_board%*36),436-(i_boa
rd%*32):PLOT5,638+(board%*36),436-(bo
ard%*32)
 2230MOVE638+(i_board%*36),436+(i_boa
rd%*32):PLOT5,638+(board%*36),436+(bo
ard%*32)
 2240MOVE638-(i_board%*36),436-(i_boa
rd%*32):PLOT5,638-(board%*36),436-(bo
ard%*32)
 2250MOVE638-(i_board%*36),436+(i_boa
rd%*32):PLOT5,638-(board%*36),436+(bo
ard%*32)
 2260FORN%=0TOnum%
 2270FORM%=0TOnum%
 2280PLOT69,638+(M%*72)-(num%*36),436
+(num%*32)-(N%*64)
 2290NEXT:NEXT
 2300COLOUR4
 2310PRINTTAB(0,1)"PLAYER 1";SPC(4);"
PLAYER 2"
 2320COLOUR7
 2330PRINTTAB(3,3)"00";SPC(10);"00"
 2340ENDPROC
```

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```
   10 REM ********************
   20 REM **     MCBASE     **
   30 REM ** (C) Micro User **
   40 REM ** by D.McLachlan **
   50 REM ********************
   60 *FX229,1
   70 *KEY 100.|MRUN|M
   80 fsp$="New file":file$=fsp$
   90 ON ERROR GOTO 4870
  100 IF ERR=&C6 OR ERR=&C9 OR ERR=&B
F THEN A=7:GOTO 720
  110 X=1:L=0:T$="on":N$="on":LM=0:I=
0:MR=0:G%=&200
  120 *KEY0END|M
  130 CLS
  150 *FX4,1
  160 VDU23;8202;0;0;0;0;
  170 PROCtitle("McBase"):START=1:PRI
NTTAB(6,3)CHR$134;"Enter option:":PRI
NT'SPC(7)"1. Make new file":PRINT'SPC
(7)"2. Load existing file"
  180 A=GET-48:IFA=2THENGOSUB2330ELSE
IFA<>1THENVDU7:GOTO180
  190 IFX<>1THEN610
  200 IF START=0 THEN GOTO 170
  210 CLS:PRINT''SPC(1)CHR$134;"How m
any fields ";:PRINTCHR$134;:INPUTSPC(
1),F%
  220 IF F%>10 THEN VDU7:PRINT''SPC(1
)CHR$134;"Too many fields":QQ=INKEY(2
00):GOTO210
  230 F$=STR$(F%):IF ASC(F$)<49 OR AS
C(F$)>59THENVDU7:GOTO210
  240 DIM no_field$(F%,2)
  250 CLS:FORL=1TOF%
  260 PRINT''SPC(1)CHR$134;"Name of f
ield";CHR$133;SPC(2);L;CHR$134;:INPUT
SPC(1)":"no_field$(L,2)
  270 IFLEN(no_field$(L,2))>12THENVDU
7:CLS:GOTO260
  280 PRINTSPC(1)CHR$(134);"Length of
 field";CHR$(134);:INPUTSPC(3)":"leng
th$:flag=0
  290 IF VAL(length$)>40 THEN VDU7,11
:PRINTSPC(40):VDU11,11:GOTO 280
  300 FOR LOOP=1 TO LEN(length$)
  310 QQ=ASC(MID$(length$,LOOP,1)):IF
 QQ<48 OR QQ>57 THEN flag=1:VDU7
  320 NEXT
  330 IF flag=1 THEN VDU11:PRINTSPC(3
9):VDU11:GOTO 280
  340 length%=VAL(length$):no_field$(
L,0)=STR$(length%):one_record%=one_re
cord%+length%+4:PRINTSPC(1)CHR$134;"(
N)umber/(S)tring";SPC(2);":";
  350 Q$=GET$:IFQ$="N"THEN no_field$(
L,1)="N":GOTO370ELSEIFQ$<>"S"THEN GOT
O 350
  360 no_field$(L,1)="S"
  370 IF Q$="S"THEN PRINT"String" ELS
E PRINT"Number"
  380 NEXT
  390 no_records%=FNfree/(2.5*one_rec
ord%)
  400 DIM A% (no_records%-1):FOR L=1
TO (no_records%-1):A%?L=0:NEXT:DIM DA
T$(no_records%,F%+1):DIM SD$(no_recor
ds%,F%+1):DIM S(no_records%)
  410 FOR L=1 TO F%:DAT$(no_records%,
L)=no_field$(L,1):DAT$(0,L)=no_field$
(L,2):NEXT
  420 GOTO610
  430 DEFPROCdataentry
  440 IFX=(no_records%-1)THEN590
  450 CLS:PRINTSPC(1)CHR$134;"Press"+
CHR$129+"f0"+CHR$134+"to finish":VDU2
8,0,24,39,4:L%=0:PRINT'''
  460 REPEAT:CLS:REPEAT:L%=L%+1:PROCa
lign(L%)
  470 PRINTTAB(1,L%+(L%-1));CHR$133;X
  480 PRINTTAB(4,L%+(L%-1));CHR$135;D
AT$(0,L%);SPC(align)" :";:INPUT" "DAT
$(X,L%)
  490 IF DAT$(X,L%)="END" THEN 560
  500 IFASC(DAT$(X,L%))=-1THENVDU7:PR
INTTAB(4,L%+(L%-1));STRING$(LEN(DAT$(
0,L%))+align+2+LEN(DAT$(X,L%))," "):G
OTO470
  510 IFLEN(DAT$(X,L%))>VAL(no_field$
(L%,0))THENVDU7:PRINTTAB(4,L%+(L%-1))
;STRING$(39," "):GOTO470
  520 FL=0:IFDAT$(no_records%,L%)="S"
THEN560
  530 FORQQ=1TOLEN(DAT$(X,L%)):IFASC(
MID$(DAT$(X,L%),QQ,1))<48 OR ASC(MID$
(DAT$(X,L%),QQ,1))>57THENFL=1
  540 NEXTQQ
  550 IFFL=1THENVDU7:PRINTTAB(0,L%+(L
%-1));SPC(40):GOTO470
  560  UNTILL%=F%ORDAT$(X,L%)="END" O
R FNfree<&300
  570 IFDAT$(X,L%)<>"END"THENX=X+1
  580 T%=L%:L%=0:UNTIL FNfree<&300 OR
 DAT$(X,T%)="END"
  590 IFX>=(no_records%-2)THENPRINTTA
B(9,15)"Sorry no more room":PRINTTAB(
10,19)CHR$134;"Press any key":A=INKEY
(200)
  600 ENDPROC
  610 REM*********** MENU ***********
  620 PROCtitle("MENU")
  630 *FX4,1
  640 PRINTSPC(12);"1. Enter data":PR
INT'SPC(12);"2. Amend data":PRINT'SPC
(12);"3. Sort data":PRINT'SPC(12);"4.
 Search data":PRINT'SPC(12);"5. Displ
ay data":PRINT'SPC(12);"6. Load data"
  650 PRINT'SPC(12);"7. Save data":PR
INT'SPC(12);"8. Print data":PRINT'SPC
(12);"9. Delete data"
  660 PRINTTAB(0,17)CHR$32;CHR$129;CH
R$157;CHR$131;SPC(2);"Press";CHR$135;
"Escape";CHR$131;"to leave McBase"
  670 PRINT'SPC(12)"Record file  :"CH
R$134;fsp$:PRINTSPC(12)"Data entered
:"CHR$134;X-1:IF FNfree<&300 THEN PRI
NTSPC(11)CHR$(129)"No more room"
  680 IF FNfree>=&300 THEN PRINTSPC(1
1)CHR$(131);"Approx free ";CHR$(135);
":";CHR$(134);INT(FNfree/(2.5*one_rec
ord%))
  690 *FX15,0
  700 START=0:A=GET-48:IF A=-21 THEN
GOTO 5010
  710 IFA<1 OR A>9THENVDU7:GOTO700
  720 ON A GOSUB740,770,1040,1210,193
0,2330,2590,2800,4090
  730 GOTO610
  740 PROCtitle("DATA ENTRY")
  750 IF FNfree<&300 THEN PRINTTAB(10
,10)CHR$(129);"Not enough room":QQ=IN
KEY(200):RETURN
  760 PROCdataentry:RETURN
  770 CLS:PROCtitle("AMEND")
  780 PRINTTAB(6,3);CHR$134;"Enter op
tion:":PRINT'SPC(7);"1. Amend field t
itles":PRINT'SPC(7);"2. Amend records
"
  790 A=GET-48:IF A=-21 THEN RETURN
  800 IFA<1 OR A>2THENVDU7:GOTO790
  810 IF A=2 AND X=1THEN PRINTTAB(10,
20)CHR$134;"No data entered":GOTO 790
  820 IFA=1THENAA%=0:GOTO840
  830 CLS:PRINT'SPC(1);CHR$134;"Enter
 record number";:INPUTAA%:IFAA%<1 OR
AA%>X-1THENVDU7,11:PRINTSTRING$(40,"
"):VDU11,11:GOTO830
  840 CLS
  850 *FX4,0
  860 IF A=1 THEN PRINT'SPC(1)CHR$131
;"Current field titles" ELSE PRINT'SP
C(1)CHR$131;"Current record"
  870 FORL=1TOF%:PROCalign(L):IF A=2
THEN PRINTSPC(2);DAT$(0,L);SPC(align)
;": ";DAT$(AA%,L):GOTO 890
  880 IF A=1 THEN PRINTCHR$133;L;CHR$
(135);DAT$(0,L);SPC(align);":";:IF DA
T$(no_records%,L)="S" THEN PRINTTAB(3
0,L+1);CHR$(133);"String" ELSE PRINTT
AB(30,L+1)CHR$(133);"Number"
  890 NEXT
  900 IF A=1 THEN PRINT'''CHR$134;SPC
(1);"Enter new field titles" ELSE PRI
```

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```
NT'''CHR$134;SPC(1);"Enter new record
"
 910 FORL=1TOF%:PROCalign(L):IF A=1
THEN PRINTCHR$(133);L;CHR$(135);:INPU
T""D$
 920 IF A=2 THEN PRINT;SPC(2)DAT$(0,
L);SPC(align);": ";:INPUT""D$
 930 IFASC(D$)<>-1THENDAT$(AA%,L)=D$
:REMGOTO1010
 940 IF A=2 THEN VDU11:PRINTSPC(2);D
AT$(0,L);SPC(align);": ";DAT$(AA%,L):
GOTO1020
 950 IF A=1THEN VDU11:PRINTCHR$(133)
;L;CHR$(135);DAT$(0,L)
 960 IF A=1 THEN PRINTTAB(29,9+L)CHR
$(133);"]";:D$=GET$
 970 IF ASC(D$)=13THEN 1010
 980 IF D$<>"S" AND D$<>"N" THEN VDU
7:GOTO960
 990 IF D$="S" THEN PRINTTAB(31,9+L)
;"String" ELSE PRINTTAB(31,9+L);"Numb
er"
 1000 DAT$(no_records%,L)=D$:GOTO 102
0
 1010 IF DAT$(no_records%,L)="S" THEN
 PRINTTAB(31,9+L);"String" ELSE PRINT
TAB(31,9+L);"Number"
 1020 NEXT
 1030 PRINT'''SPC(4)CHR$134;"Press an
y key to continue":A=GET:RETURN
 1040 PROCtitle("SORT"):IFX=1THENPRIN
TTAB(10,6)CHR$134;"No data entered":A
=INKEY(400):RETURN
 1050 FORLF=1TOF%:PRINTSPC(10);LF;".
";DAT$(0,LF):NEXT
 1060 PRINT'SPC(1)CHR$134;"Enter fiel
d number to sort"
 1070 SF%=GET-48:IF SF%=-21 THEN RETU
RN
 1080 IFSF%<1 OR SF%>F%THENVDU7:GOTO1
070
 1090 S$=CHR$136+"Sorting"+CHR$137+DA
T$(0,SF%):M=18-(LEN(S$)/2):PRINTTAB(M
,15);S$
 1100 FORB=1TOF%:SD$(0,B)=DAT$(0,B):N
EXTB:FORA=1TOX-1:FORL=1TOF%:SD$(A,L)=
DAT$(A,L):NEXTL:NEXTA
 1110 FORNN=1TOX-1:FORN=1TOX-2
 1120 IF DAT$(no_records%,SF%)="S" TH
EN 1140
 1130 IF VAL(SD$(N,SF%))<VAL(SD$(N+1,
SF%))THEN1170 ELSE 1150
 1140 IFSD$(N,SF%)<SD$(N+1,SF%)THEN11
70
 1150 FORL=1TOF%:TEMP$=SD$(N,L):SD$(N
,L)=SD$(N+1,L):SD$(N+1,L)=TEMP$:IF FN
free<&300 THEN N=X-2:NN=X-1:L=F%
 1160 NEXTL
 1170 NEXTN:NEXTNN
 1180 IF FNfree<&300 THEN PRINT TAB(1
0,10);"Sorry not enough room to sort"
:GOTO 1200
 1190 S$=DAT$(0,SF%)+" now sorted":M=
18-(LEN(S$)/2):PRINTTAB(M,15);S$
 1200 PRINTTAB(10,20)CHR$134;"Press a
ny key":B=INKEY(400):RETURN
 1210 PROCtitle("SEARCH"):PRINTTAB(6,
3);CHR$134;"Enter option:":PRINT'''SP
C(7);"1. Search original data":PRINT'
SPC(7);"2. Search marked data"
 1220 OPT=GET-48:IF OPT=-21 THEN RETU
RN
 1230 IF MR<1 AND OPT=2 THEN VDU7:PRI
NTTAB(10,15);CHR$(134);"No marked dat
a":GOTO 1220
 1240 IFOPT<1 OR OPT>2THENVDU7:GOTO12
20
 1250 CLS
 1260 FORLF=1TOF%:PRINTSPC(10);LF;".
";DAT$(0,LF):NEXT
 1270 PRINT'SPC(1);CHR$134;"Enter fie
ld number to search"
 1280 A$=GET$:IFVAL(A$)<1 OR VAL(A$)>
F%THEN1250
 1290 F=VAL(A$)
 1300 NUM=0
 1310 CLS:PRINTTAB(6,3)CHR$134;"Enter
 option:":PRINT'SPC(2)"1. Search (ful
l string)":PRINT'SPC(2)"2. Search (pa
rt string)":PRINT'SPC(2)"3. Search be
tween numbers"
 1320 A=GET:A=A-48:IF A=-21 THEN RETU
RN
 1330 IFA<1 OR A>3THENVDU7:GOTO 1320
ELSE ON A GOTO 1340,1540,1820
 1340 PRINT''SPC(1);CHR$134;"Enter st
ring";CHR$135;:INPUT""S$
 1350 CLS
 1360 IFOPT=2THEN1420
 1370 PRINT''SPC(1);CHR$130"Searching
 for ";S$
 1380 FORNN=1TOX
 1390 IFDAT$(NN,F)=S$THENNUM=NUM+1:S(
NUM)=NN:PRINTTAB(3,10)"Number of repe
titions of ";S$;" = ";NUM
 1400 NEXT
 1410 GOTO1450
 1420 PRINT''SPC(1);CHR$130"Searching
 for ";S$:FORNN=1TOX
 1430 IFA%?NN=1 THEN IF DAT$(NN,F)=S$
THENNUM=NUM+1:S(NUM)=NN
 1440  PRINTTAB(3,10)"Number of repet
itions of ";S$;" = ";NUM:NEXTNN
 1450 IFNUM=0THENPRINT''SPC(12)CHR$13
4;"Press any key":A=INKEY(1000):GOTO1
530
 1460 PRINT''SPC(1);CHR$134;"Display
found data ?"
 1470 A=GET:IFA=78THENRETURNELSEIFA<>
89THEN1470
 1480 FORZ=1TONUM
 1490 CLS:PRINTTAB(2,0);"Record No.";
S(Z)
 1500 FORF=1TOF%:PROCalign(F):PRINTSP
C(2);DAT$(0,F);SPC(align);": ";DAT$(S
(Z),F):NEXT
 1510 PRINTTAB(5,21)CHR$134;"Press RE
TURN to finish":B=GET:IFB=13THENZ=NUM
 1520 NEXT
 1530 RETURN
 1540 PRINT''SPC(1);CHR$134;"Enter pa
rt string";CHR$135;:INPUT""PS$
 1550 IFASC(PS$)=-1THENVDU11,11:PRINT
:VDU11:GOTO1540
 1560 CLS:NUM=0:PRINT''SPC(1);CHR$130
"Searching for ";PS$:LPS=LEN(PS$)
 1570 IF OPT=2 THEN 1690
 1580 FORLOOP=1TOX
 1590 FORLOOP1=1TOLEN(DAT$(LOOP,F))
 1600 IFMID$(DAT$(LOOP,F),LOOP1,LPS)=
PS$THENNUM=NUM+1:S(NUM)=LOOP
 1610 PRINTTAB(3,10)"Number of repeti
tions of ";PS$;" = ";NUM:NEXT:NEXT
 1620 IFNUM=0 THENPRINT''SPC(12)CHR$(
134)"Press any key":A=INKEY(1000):GOT
O1680
 1630 CLS:PRINTSPC(1)CHR$(134);"Displ
ay found data ?"
 1640 A=GET:IFA=78THENRETURNELSEIFA<>
89THEN1640
 1650 FORZ=1TONUM:CLS:PRINTTAB(2,0);"
Record No.";S(Z):FORF=1TOF%:PROCalign
(F):PRINTSPC(2)DAT$(0,F);SPC(align);"
: ";DAT$(S(Z),F):NEXTF
 1660 PRINT'''SPC(1);CHR$(134);"Retur
n to finish":A=GET:IFA=13 THENZ=NUM
 1670 NEXT
 1680 RETURN
 1690 FOR LOOP=1 TO X
 1700 IF A%?LOOP=0 THEN 1750
 1710 FOR LOOP1=1 TO LEN(DAT$(LOOP,F)
)
 1720 IF MID$(DAT$(LOOP,F),LOOP1,LPS)
=PS$THEN NUM=NUM+1:S(NUM)=LOOP
 1730 PRINTTAB(3,10)"Number of repeti
tions of ";PS$;" = ";NUM
 1740 NEXT
 1750 NEXT
 1760 IFNUM=0 THENPRINT''SPC(12)CHR$(
134)"Press any key":A=INKEY(1000):GOT
O1680
 1770 CLS:PRINTSPC(1)CHR$(134);"Displ
ay found data ?"
```

→

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```
 1780 A=GET:IFA=78 THEN RETURN ELSE I
F A<>89 THEN 1780
 1790 FORZ=1TONUM:CLS:PRINTTAB(2,0);"
Record No.";S(Z):FORF=1TOF%:PROCalign
(F):PRINTSPC(2)DAT$(0,F);SPC(align);"
: ";DAT$(S(Z),F):NEXTF
 1800 PRINT'''SPC(1);CHR$(134);"Retur
n to finish":A=GET:IFA=13 THENZ=NUM
 1810 NEXT:RETURN
 1820 IFDAT$(no_records%,F)="S"THEN13
00
 1830 PRINT'CHR$134;SPC(1);"Enter low
er limit";:INPUTLL:PRINT'CHR$134;SPC(
1);"Enter higher limit";:INPUTHL
 1840 A=1:CLS:PRINT''SPC(1);CHR$130;"
Searching between ";LL;" and ";HL
 1850 FORL=1TOX-1:V=VAL(DAT$(L,F))
 1860 IF V>=LL AND V<=HL THEN NUM=NUM
+1:S(NUM)=L
 1870 PRINTTAB(3,10)"Number of repeti
tions = ";NUM:NEXTL
 1880 PRINTTAB(2,21);CHR$134;"Display
 found data ?"
 1890 A$=GET$:IFA$="N"THENRETURN
 1900 CLS:FORZ=1TONUM:PRINT'SPC(37);S
(Z):FORF=1TOF%:PROCalign(F):PRINTSPC(
2);DAT$(0,F);SPC(align);": ";DAT$(S(Z
),F):NEXTF
 1910 PRINTTAB(12,21)CHR$134;"Return
to finish":B=GET:IFB=13 THENZ=A
 1920 CLS:NEXTZ:RETURN
 1930 PROCtitle("DISPLAY DATA")
 1940 *FX15,0
 1950 *FX21,0
 1960 PRINTTAB(6,3);CHR$134;"Enter op
tion:":PRINT''SPC(7)"1. Display origi
nal data":PRINT'SPC(7)"2. Display sor
ted data":PRINT'SPC(7)"3. Display mar
ked data"
 1970 IFX=1THENPRINTTAB(10,20)CHR$134
;"No data entered":QQ=INKEY(400):RETU
RN
 1980 A=GET-48:IF A=-21 THEN RETURN
 1990 IFA<1 OR A>3THENVDU7:GOTO1980
 2000 IF A=2 AND SD$(1,1)="" THEN VDU
7:PRINTTAB(10,20)CHR$134;"No sorted d
ata ":GOTO 1980
 2010 PRINT TAB(10,20);STRING$(20," "
):VDU11,11,11,11
 2020 IFA=3THEN2250
 2030 PRINT''SPC(1);CHR$134;"Number t
o start....";CHR$135;:INPUTSL
 2040 IFSL=0THENSL=1:VDU11:PRINTSPC(1
);CHR$134;"Number to start....";CHR$1
35;"?";SL;STRING$(7," ")
 2050 PRINT'SPC(1)CHR$134;"Number to
finish...";CHR$135;:INPUTFL
 2060 IFFL=0THENFL=X-1:VDU11:PRINTSPC
(1)CHR$134;"Number to finish...";CHR$
135;"?";FL;STRING$(7," ")
 2070 FOR DSP=SL TO FL
 2080 CLS:PRINT'SPC(2)"Record No. ";D
SP
 2090 IFA%?DSP=1THENPRINTTAB(30,1)CHR
$130;"Marked  "ELSEPRINTTAB(30,1)CHR$
131"Unmarked"
 2100 FORFE=1TOF%
 2110 PROCalign(FE)
 2120 IFA=1THENPRINTSPC(2)DAT$(0,FE);
SPC(align);" : ";DAT$(DSP,FE)
 2130 IFA=2THENPRINTSPC(2)SD$(0,FE);S
PC(align);" : ";SD$(DSP,FE)
 2140 NEXTFE
 2150 PRINT':PRINTTAB(4,19)CHR$131;"M
";CHR$134;"to mark";CHR$131;"D";CHR$1
34"to delete mark":PRINTTAB(9,21)CHR$
131;"RETURN";CHR$134;"to finish":PRIN
TTAB(10,20)CHR$131;"SPACE";CHR$134;"t
o go on"
 2160 Q$=GET$:IFASC(Q$)=13THENDSP=FL:
GOTO 2220
 2170 Q%=ASC(Q$)
 2180 IFQ%=77THENIF A%?DSP=0 THEN MR=
MR+1:A%?DSP=1:PRINTTAB(30,1)CHR$130;"
Marked  "
 2190 IFQ%=68THEN IF A%?DSP=1 THEN MR
=MR-1:A%?DSP=0:PRINTTAB(30,1)CHR$131"
Unmarked"
 2200 IFQ%<>32THEN2160
 2210 *FX15,0
 2220 NEXTDSP
 2230 *FX15,0
 2240 RETURN
 2250 FORDSP=1TOX-1:CLS
 2260 IFA%?DSP=1THENPRINT'DSP;".":PRI
NTTAB(30,1)CHR$130;"Marked  ":FORF=1T
OF%:PRINTSPC(2)DAT$(0,F);" : ";DAT$(D
SP,F):NEXT
 2270 IFA%?DSP<>1THEN2320
 2280 PRINTTAB(9,21)CHR$135;"D";CHR$1
34"to delete mark":PRINTTAB(9,20)CHR$
134;"RETURN to finish ":PRINTTAB(10,1
9)CHR$134;"SPACE to go on "
 2290  Q$=GET$:Q%=ASC(Q$):IFQ%=68THEN
DSP?A$=0:PRINTTAB(30,1)CHR$131"Unmark
ed":GOTO2290
 2300 IFQ%=13 THEN DSP=X-1:RETURN ELS
E IFQ%<>32 THEN 2300
 2310 *FX15,0
 2320 NEXTDSP:RETURN
 2330 PROCtitle("LOAD DATA")
 2340 IF PAGE<>&E00 PROCcatalog: VDU
28,0,24,39,19
 2360 CLS:PRINTSPC(1)CHR$(134);"Enter
";CHR$(135);"*";CHR$(134);"to exit":P
RINT'SPC(1)CHR$134;"Enter file name..
.";CHR$135;:INPUT""file$
 2370 IF ASC(file$)=-1 THEN GOTO 2340
 2380 IF file$="*" AND START=1 THEN S
TART=0:RETURN ELSE IF file$="*" THEN
RETURN
 2390 $&780=file$
 2400 IF OPENUP(file$)=FALSE THEN CLO
SE#0:PRINT'SPC(1)CHR$134;"No such fil
e":VDU7:QQ=INKEY(200):GOTO 2360 ELSE
CLOSE#0
 2410 CLEAR:START=0:fsp$=$&780
 2420 PL=0:FOR LOOP=1 TO LEN(fsp$)
 2430 IF MID$(fsp$,LOOP,1)="." THEN P
L=LOOP
 2440 NEXT LOOP
 2450 IF PL=2 THEN IF LEN(fsp$)>9 THE
N VDU7:GOTO2360
 2460 IF PL=0 THEN IF LEN(fsp$)>7 THE
N VDU7:GOTO2360
 2470 IF PL<>0 AND PL<>2 THEN VDU7:GO
TO2360
 2480 CH=1:CH=OPENUP(fsp$)
 2490 INPUT#CH,one_record%,no_records
%,X,F%,I%,T%,A,C,L
 2500 DIMno_field$(F%,2)
 2510 FOR LOOP=1 TO F%:INPUT#CH,no_fi
eld$(LOOP,0),no_field$(LOOP,1),no_fie
ld$(LOOP,2):NEXT
 2520 DIMDAT$(no_records%,F%+1),S(no_
records%),SD$(no_records%,F%+1)
 2530 FORLOOP=0TOX:INPUT#CH,S(LOOP):N
EXT
 2540 FORLOOP1=1TOF%
 2550 FORLOOP=0TOX:INPUT#CH,DAT$(LOOP
,LOOP1),SD$(LOOP,LOOP1):NEXT
 2560 NEXT
 2570 FORLO=1TOF%:INPUT#CH,DAT$(no_re
cords%,LO):NEXT
 2580 CLOSE#CH:L=0:T$="on":N$="on":LM
=0:I=0:MR=0:DIMA% (no_records%-2):FOR
L=1TO100:A%?L=0:NEXT:PROCfsp:GOTO610
 2590 PROCtitle("SAVE DATA"):IFPAGE<>
&E00 PROCcatalog:VDU28,0,24,39,19
 2600 CLS:PRINTSPC(1)CHR$(134);"Enter
";CHR$(135);"*";CHR$(134);"to exit":P
RINT'SPC(1)CHR$134;"Enter file name..
.";CHR$135;:INPUT""file$
 2610 IF ASC(file$)=-1 THEN GOTO 2590
 2620 IF file$="*" THEN RETURN
 2630 fsp$=file$:PL=0:FOR LOOP=1 TO L
EN(fsp$):IF MID$(fsp$,LOOP,1)="." THE
N PL=LOOP
 2640 NEXT LOOP
 2650 IF PL=2 THEN IF LEN(fsp$)>9 THE
N VDU7:GOTO2600
 2660 IF PL=0 THEN IF LEN(fsp$)>7 THE
N VDU7:GOTO2600
 2670 IF PL<>0 AND PL<>2 THEN VDU7:GO
TO2600
```

```
 2680 CH=1:CH=OPENOUT(fsp$)
 2690 PRINT#CH,one_record%,no_records
%,X,F%,I%,T%,A,C,L
 2700 FOR LOOP=1 TO F%:PRINT#CH,no_fi
eld$(LOOP,0),no_field$(LOOP,1),no_fie
ld$(LOOP,2):NEXT
 2710 FORLOOP=0TOX:PRINT#CH,S(LOOP):N
EXT
 2720 FORLOOP1=1TOF%
 2730 FORLOOP=0TOX
 2740 PRINT#CH,DAT$(LOOP,LOOP1),SD$(L
OOP,LOOP1)
 2750 NEXT:NEXT
 2760 FORLO=1TOF%:PRINT#CH,DAT$(no_re
cords%,LO):NEXT
 2770 CLOSE#CH
 2780 PROCfsp
 2790 IF ERR=&C6 THEN GOTO 620 ELSE R
ETURN
 2800 PROCtitle("PRINT"):T$="on":N$="
on":LM=2:I=10:SPA=1:SP=1:PRINTTAB(6,3
)CHR$134;"Enter option:":PRINTTAB(7,6
)"1. Standard printout":PRINTTAB(7,8)
"2. Non-standard printout"
 2810 A=GET-48:IF A=-21 THEN RETURN
 2820 IFA<1 OR A>2THEN2810
 2830 P$="":FOR LOOP=1 TO F%:P$=P$+ST
R$(LOOP)+"+":NEXT:P$=LEFT$(P$,LEN(P$)
-1)
 2840 CLS:PRINTTAB(6,3)CHR$134;"Enter
 option:":PRINTTAB(7,6)"1. Print orig
inal records":PRINTTAB(7,8)"2. Print
sorted records":PRINTTAB(7,10)"3. Pri
nt marked records"
 2850 opt=GET-48:IF opt=-21 THEN RETU
RN
 2860 IFopt<1 OR opt>3THEN2850
 2870 IF MR=0 AND opt=3 THEN PRINTTAB
(10,20);CHR$134;"No marked records":Q
W=INKEY(200):PRINTTAB(10,20);STRING$(
20," "):GOTO 2850
 2880 IF SD$(1,1)="" AND opt=2 THEN P
RINTTAB(10,20);CHR$134;"No sorted rec
ords":QW=INKEY(200):PRINTTAB(10,20);S
TRING$(20," "):GOTO 2850
 2890 IFA=1THENCLS:GOTO3510
 2900 VDU3:CLS
 2910 PRINTTAB(6,3)CHR$134;"Enter opt
ion:":PRINT'SPC(7);"1. Alter *FX6 (";
I;")":PRINT'SPC(7);"2. Titles (";T$;"
)":PRINT'SPC(7);"3. Numbering (";N$;"
)"
 2920 PRINT'SPC(7);"4. Field order":P
RINT'SPC(7);"5. Left margin (";LM;")"
:PRINT'SPC(7);"6. No of spaces (";SPA
;")":PRINT'SPC(7);"7. Start printout"
 2930 A=GET-48:IF A=-21 THEN RETURN
 2940 IFA<1 OR A>7THENVDU7:GOTO2930
 2950 IFA=1THENPROCf:CLS:GOTO2910
 2960 IFA=2THENIFT$="on"T$="off":PRIN
TTAB(18,7);T$;")":GOTO2930ELSEIFA=2TH
ENIFT$="off"T$="on":PRINTTAB(18,7);T$
;") ":GOTO2930
 2970 IFA=3THENIFN$="on"N$="off":PRIN
TTAB(21,9);N$;")":GOTO2930ELSEIFA=3TH
ENIFN$="off"N$="on":PRINTTAB(21,9);N$
;") ":GOTO2930
 2980 IFA=4THENGOSUB3980:GOTO2900
 2990 IFA=5THENPRINTTAB(1,20)CHR$134;
"Left margin - ";:INPUTLM:IFLM<0 OR L
M>40THENVDU7:PRINTTAB(1,20)STRING$(20
," "):GOTO2990
 3000 IFA=6THENPRINTTAB(1,20)CHR$134;
"Number of spaces";:INPUTSPA:IFSP<0TH
ENVDU7:PRINTTAB(1,20)STRING$(20," "):
GOTO3000ELSEIFA=6CLS:GOTO2910
 3010 IFA<>7THEN2900
 3020 IFopt=3 THEN3100
 3030 CLS
 3040 PRINTTAB(1,1);CHR$134;"Print fr
om";CHR$135;:INPUTSP;
 3050 IF SP=0 THEN SP=1:PRINTTAB(14,1
);SP
 3060 IFSP<1 OR SP>X-1THENVDU7:CLS:GO
TO3040
 3070 PRINTTAB(1,3);CHR$134;"Print to
";CHR$135;:INPUTEP;
 3080 IF EP=0 THEN EP=X-1:PRINTTAB(14
,3);EP
 3090 IFEP<SP OR EP>X-1 THENVDU7,11:P
RINTSTRING$(20," "):VDU11:GOTO3070
 3100 LM$=STRING$(LM," "):DD$=""
 3110 VDU2,21
 3120 FORK=1TOF%:DD$=DD$+DAT$(0,K)+"
":NEXTK
 3130 IFMID$(P$,2,1)="," THEN 3140 EL
SE IF T$="on"THENPRINTDD$
 3140 IFopt<>3 THEN3310
 3150 FORW=1TOX-1:D$="":IF INKEY(-66)
 THEN PROCa:W=X-1:GOTO 3290
 3160 IFA%?W=0THENGOTO3290
 3170 IF MID$(P$,2,1)="+" THEN 3180 E
LSE  IF N$="on" THEN PRINT LM$+"Recor
d No. ";W
 3180 FORLO=1TOLEN(P$) STEP 2
 3190 PROCalign(VAL(MID$(P$,LO,1)))
 3200 IF MID$(P$,2,1)="+" THEN 3240
 3210 IF T$="on" THEN TI$=LM$+DAT$(0,
VAL(MID$(P$,LO,1)))+STRING$(align," "
)+":" ELSE TI$=LM$+STRING$(align," ")
 3220 PRINT TI$+DAT$(W,VAL(MID$(P$,LO
,1)))
 3230 GOTO3250
 3240 D$=D$+DAT$(W,VAL(MID$(P$,LO,1))
)+STRING$(SP," ")
 3250 NEXT LO
 3260 IF MID$(P$,2,1)=","THEN 3280
 3270 IFN$="on"THENPRINTLM$+STR$(W)+"
 "+D$ELSEIFN$="off"PRINTLM$+D$
 3280 FOR NSP=1 TO SPA:PRINT:NEXT
 3290 NEXTW
 3300 GOTO3490
 3310 FOR LOOP=SP TO EP
 3320 D$=""
 3330 IF INKEY(-66) THEN PROCa:LOOP=E
P:GOTO3480
 3340 IF MID$(P$,2,1)="," AND N$="on"
THENPRINTLM$+"Record No. ";LOOP
 3350 FORLO=1TOLEN(P$) STEP 2
 3360 PROCalign(VAL(MID$(P$,LO,1)))
 3370 IF MID$(P$,2,1)="+" THEN 3420
 3380 IF T$="on" THEN TI$=LM$+DAT$(0,
VAL(MID$(P$,LO,1)))+STRING$(align," "
)+":" ELSE TI$=LM$+STRING$(align," ")
 3390 IF opt=2 THEN PRINTTI$+SD$(LOOP
,VAL(MID$(P$,LO,1)))
 3400 IF opt=1 THEN PRINTTI$+DAT$(LOO
P,VAL(MID$(P$,LO,1)))
 3410 GOTO3440
 3420 IFopt=2THEND$=D$+SD$(LOOP,VAL(M
ID$(P$,LO,1)))+STRING$(SP," ")
 3430 IFopt=1THEND$=D$+DAT$(LOOP,VAL(
MID$(P$,LO,1)))+STRING$(SP," ")
 3440 NEXTLO
 3450 IF MID$(P$,2,1)="," THEN 3470
 3460 IFN$="on"THENPRINTLM$+STR$(LOOP
)+" "+D$ELSEIFN$="off"PRINTLM$+D$
 3470 FOR NSP=1 TO SPA:PRINT:NEXT
 3480 NEXTLOOP
 3490 VDU3,6
 3500 GOTO2900
 3510 VDU3:CLS
 3520 PRINTTAB(6,3)CHR$134;"Enter opt
ion:":PRINT'SPC(7);"1. Alter *FX6 (";
I;")":PRINT'SPC(7);"2. Start printout
"
 3530 A=GET-48:IF A=-21 THEN RETURN
 3540 IFA<1 OR A>2THENVDU7:GOTO3530
 3550 IFA=1THENPROCf:CLS:GOTO3510
 3560 IFA<>2THEN3530
 3570 IFopt=3THEN3820
 3580 CLS:PRINTTAB(1,1);CHR$134;"Prin
t from";CHR$135;:INPUTSP;
 3590 IF SP=0 THEN SP=1:PRINTTAB(14,1
);SP
 3600 IFSP<0 OR SP>X-1THENCLS:GOTO358
0
 3610 PRINTTAB(1,3);CHR$134;"Print to
";CHR$135;:INPUTEP;
 3620 IF EP=0 THEN EP=X-1:PRINTTAB(14
,3);EP
```

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```
 3630 IFEP<SP OR EP>X-1 THENPRINTTAB(
1,3)STRING$(20," "):GOTO3610
 3640 FORL=1TOF%:LE=LEN(DAT$(0,L)):IF
LEN(DAT$(0,L+1))>LE THEN LE=LEN(DAT$(
0,L+1)):NEXT
 3650 LM$=STRING$(2," "):L$=STRING$(L
E," ")
 3660 VDU2,21
 3670 FOR LOOP=SP TO EP
 3680 IF INKEY(-66) THEN PROCa:LOOP=E
P:GOTO 3790
 3690 IFN$="on"THENPRINTSPC(2);"Recor
d No. ";LOOP
 3700 D$=""
 3710 FORFI=1TOF%
 3720 PROCalign(FI)
 3730 TI$=DAT$(0,FI)+STRING$(align,"
")+":"
 3740 IFopt=2THEND$=TI$+SD$(LOOP,FI)
 3750 IFopt=1THEND$=TI$+DAT$(LOOP,FI)
 3760 PRINTSPC(2);D$
 3770 NEXTFI
 3780 PRINT''
 3790 NEXTLOOP
 3800 VDU3,6
 3810 GOTO3510
 3820 FORL=1TOF%:LE=LEN(DAT$(0,L)):IF
LEN(DAT$(0,L+1))>LE THEN LE=LEN(DAT$(
0,L+1)):NEXT
 3830 L$=STRING$(LE," ")
 3840 VDU2,21
 3850 FORLOOP=1TOX-1
 3860 IF INKEY(-66) THEN PROCa:LOOP=X
-1:GOTO 3950
 3870 IFA%?LOOP=0THEND$="":GOTO3950
 3880 PRINTSPC(2);"Record No. ";LOOP
 3890 FORFI=1TOF%
 3900 PROCalign(FI)
 3910 TI$=DAT$(0,FI)+STRING$(align,"
")+":"
 3920 D$=TI$+DAT$(LOOP,FI):PRINTSPC(2
);D$
 3930 NEXTFI
 3940 D$="":PRINT''
 3950 NEXTLOOP
 3960 VDU3,6
 3970 GOTO3510
 3980 CLS:PRINT'SPC(1);CHR$134;"Enter
 field order (1,2,3...)"
 3990 INPUTLINETAB(2,2);FO$
 4000 IFASC(FO$)=-1THENVDU7,11:PRINTS
TRING$(20," "):GOTO3990
 4010 F=1:FOR L=1 TO LEN(FO$):IF MID$
(FO$,L,1)="," OR MID$(FO$,L,1)="+" OR
 (ASC(MID$(FO$,L,1))>48 AND ASC(MID$(
FO$,L,1))<=48+F%) THEN F=0
 4020 IF F=1 THEN L=LEN(FO$)
 4030 NEXT
 4040 IF F=1THENVDU7,11:PRINTSTRING$(
20," "):GOTO3990
 4050 P$=FO$:CLS:RETURN
 4060 DEFPROCf:CLS:PRINT'SPC(1);CHR$1
34;"Enter code *FX6,";
 4070 A$=GET$:IF ASC(A$)=13 THEN PRIN
T"10":I=10:PROCx(6,I) ELSE PRINTA$:I=
VAL(A$):PROCx(6,I)
 4080 ENDPROC
 4090 PROCtitle("DELETE")
 4100 PRINTTAB(6,3)CHR$134;"Enter opt
ion:"
 4110 PRINT'SPC(7)"1. Delete record":
PRINT'SPC(7)"2. Delete records":PRINT
'SPC(7)"3. Delete markers":PRINT'SPC(
7)"4. Delete marked records"
 4120 IFX=1THENPRINTTAB(10,20)CHR$134
;"No data entered"
 4130 A=GET-48:IF A=-21 THEN RETURN
 4140 IFA<1 OR A>4THENVDU7:GOTO4130
 4150 IFA=5THENRETURN
 4160 IFX=1THEN4130
 4170 IFA=1THEN4270
 4180 IFA=2THEN4400
 4190 IF MR=0 AND A=4 THEN PRINTTAB(9
,17)CHR$134;"No marked records":W=INK
EY(200):PRINTTAB(9,17);STRING$(20," "
):GOTO4130
 4200 IF MR=0 AND A=3 THEN PRINTTAB(1
0,17)CHR$134;"No markers":W=INKEY(200
):PRINTTAB(10,17);STRING$(12," "):GOT
O4130
 4210 IF A=4 THEN 4550
 4220 IF A=3 THEN PRINTTAB(10,17)CHR$
134;"Are you sure (Y/N)?"
 4230 SS=GET AND &DF:IF SS=78 THEN PR
INTTAB(10,17)STRING$(30," "):GOTO 413
0 ELSE IF SS<>89 THEN 4230
 4240 MR=0
 4250 FORL=1 TOX-1:A%?L=0:NEXT:PRINTT
AB(10,17)CHR$130;"Markers deleted";ST
RING$(5," ")
 4260 A=INKEY(250):PRINTTAB(10,17)STR
ING$(20," "):GOTO 4130
 4270 CLS:PRINT'SPC(1)CHR$134;"Enter
number";
 4280 INPUTD
 4290 IFD=0THENVDU7:GOTO4090
 4300 CLS:PRINT'':FORLL=1TOF%:PROCali
gn(LL):PRINTSPC(2)DAT$(0,LL);SPC(alig
n);": ";DAT$(D,LL):NEXT
 4310 PRINTTAB(9,20);CHR$134;"Are you
 sure (Y/N)?"
 4320 SS=GET AND &DF:IF SS=78 THEN409
0 ELSE IF SS<>89 THEN 4320
 4330 CLS:PRINTTAB(13,20);CHR$130;"De
leted";STRING$(10," "):IF A%?D=1 THEN
 MR=MR-1
 4340 FOR L=D TO X-1
 4350 FORLL=1TOF%
 4360 DAT$(L,LL)=DAT$(L+1,LL):A%?L=A%
?L+1
 4370 NEXTLL:NEXTL
 4380 X=X-1
 4390 A=INKEY(250):GOTO4090
 4400 CLS:PRINT'SPC(1)CHR$134;"Enter
lower limit";:INPUTLA
 4410 IFLA<1 OR LA>X-1THENVDU7,11:PRI
NTSTRING$(40," "):VDU11,11,11:GOTO440
0
 4420 PRINT'SPC(1)CHR$134;"Enter high
er limit";:INPUTHN
 4430 IFHN<LA OR HN>X-1THENVDU7,11:PR
INTSTRING$(40," "):VDU11,11,11:GOTO44
20
 4440  PRINTTAB(10,10);CHR$134;"Are y
ou sure (Y/N)?"
 4450  SS=GET AND &DF:IF SS=78 THEN 4
090 ELSE IF SS<>89 THEN 4450
 4460 PRINTTAB(10,10);CHR$130;LA;" to
 ";HN;" deleted";SPC(5):Z=0
 4470 FOR L=HN+1 TO X-1
 4480 IF A%?(LA+Z)=1 THEN MR=MR-1
 4490 FORLL=1TOF%
 4500 DAT$(LA+Z,LL)=DAT$(L,LL):A%?(LA
+Z)=A%?L
 4510 NEXTLL
 4520 Z=Z+1
 4530 NEXTL
 4540 X=X-(HN-(LA-1)):A=INKEY(250):GO
TO4090
 4550 PRINTTAB(10,17)CHR$134;"Are you
 sure (Y/N)?"
 4560 SS=GET AND &DF:IF SS=78 THEN PR
INTTAB(10,17)STRING$(30," "):GOTO 413
0 ELSE IF SS<>89 THEN 4560
 4570 PRINTTAB(5,17);CHR$130;"Marked
records deleted";STRING$(10," ")
 4580 L=1
 4590 IF A%?L=0 THEN L=L+1:GOTO 4590
 4600 FOR L1=L TO X-1
 4610 A%?L1=A%?(L1+1)
 4620 FOR L2=1 TO F%
 4630 DAT$(L1,L2)=DAT$(L1+1,L2)
 4640 NEXT L2,L1
 4650 MR=MR-1:X=X-1
 4660 IF MR<>0 THEN 4580
 4670 A=INKEY(250):PRINTTAB(5,17);STR
ING$(30," "):GOTO4130
 4680 DEFPROCcatalog
 4690 VDU28,2,24,39,4
 4700 CLS
 4710 *CAT 0
 4720 ENDPROC
```

```
4730 DEFPROCtitle(S$)
4740 TT$="":VDU28,0,24,39,0:CLS
4750 FORLOOP=1TOLEN(S$):TT$=TT$+MID$(S$,LOOP,1)+CHR$(32):NEXT
4760 C=LEN(S$)/2:FORLOOP=1TO2:PRINTCHR$141;CHR$129;CHR$157;CHR$131;TAB(20-(LEN(TT$)/2));TT$:NEXT
4770 VDU28,0,24,39,2
4780 ENDPROC
4790 DEFPROCalign(LL)
4800 LOCAL L,LE
4810 LE=LEN(DAT$(0,1))
4820 FOR L=1 TO F%-1:IF LE<LEN(DAT$(0,L+1)) THEN LE=LEN(DAT$(0,L+1))
4830 NEXT
4840 align=LE-LEN(DAT$(0,LL))+1
4850 ENDPROC
4860 DEFPROCx(A%,X%):Y%=0:CALL&FFF4:ENDPROC
4870 REM **** ERROR REPORTS ****
4880 IF ERR=&BF THEN PRINT'SPC(1)CHR$134;"Can't extend the file":VDU7:FOR L=1 TO 2000:NEXT:GOTO 90
4890 IF ERR=&B THEN PRINT'SPC(1)CHR$134;"Not enough memory":QQ=INKEY(200):RUN
4900 IF ERR=&C9 THEN PRINT'SPC(1)CHR$134;"Write protected":QQ=INKEY(200):GOTO 90
4910 IF ERR=&C6 THEN PRINT'SPC(1)CHR$134;"Disc full":QQ=INKEY(200):GOTO 90
4920 REPORT:PRINT" AT LINE ";ERL
4930 *FX4
4940 *FX12,2
4950 *FX229
4960 STOP
4970 DEFPROCa
4980 *FX15
4990 VDU0,0,3,6
5000 ENDPROC
5010 PRINTTAB(0,17);CHR$32;CHR$129;CHR$157;CHR$131;SPC(7);"Are you sure (Y/N)?";SPC(8)
5020 A=GET AND &DF:IF A=78 THEN GOTO 660 ELSE IF A<>89 THEN 5020
5030 PRINTTAB(0,17);CHR$32;CHR$129;CHR$157;CHR$131;SPC(2);"Break to start from scratch";SPC(8)
5040 A=GET:MODE 7
5050 *FX4
5060 *FX229
5070 END
5080 DEFPROCfsp
5090 F=0:FORLOOP=1TOLEN(fsp$):IFASC(MID$(fsp$,LOOP,1))>90THENF=1:NEXT:IFF=1THEN5170
5100 IF MID$(fsp$,2,1)="." THEN ST=4:F$=LEFT$(fsp$,3):FF$="":GOTO 5120
5110 F$=LEFT$(fsp$,1):FF$="":ST=2
5120 FOR LOOP=ST TO LEN(fsp$)
5130 IFASC(MID$(fsp$,LOOP,1))<65THENFF$=FF$+MID$(fsp$,LOOP,1)ELSEFF$=FF$+CHR$(ASC(MID$(fsp$,LOOP,1))+32)
5140 NEXTLOOP
5150 fsp$=F$+FF$:ENDPROC
5160 DEFFNfree
5170 =HIMEM-(!2 AND &FFFF)
```

This listing is included in this month's cassette tape offer. See order form on Page 215.

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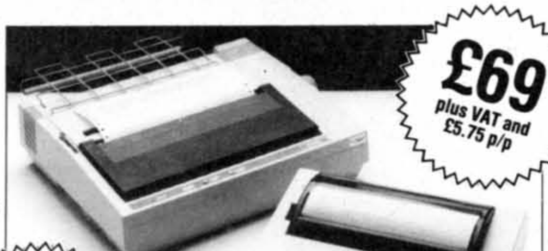

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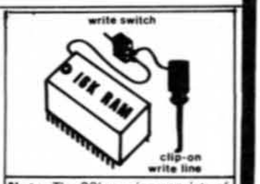

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Get those field shift factors taped

REGARDING field shift factors mentioned in Micromail in April, June, August and October, the underlying cause of all the effects noted by your correspondents can be fairly easily explained.

On starting a PRINT statment the hex flag is reset and the field width to be used is obtained from that specified in @%.

When printing numbers, Basic will always try to right-justify the number in the print field, adding leading spaces as necessary.

If the number is too long for the field width it will extend to the right of the field.

However strings are always printed left justified, and no trailing spaces are added.

When each item in a print list is printed, Basic assumes that it is already positioned at the start of a field.

This will be true after printing a number that has not overflowed its field width, but is not necessarily true otherwise.

The effect of a comma in the print list is to force Basic to move to the start of the next print field, if it is not already there, and then to reset the field width to that specified in @%, and also to reset the hex flag.

The effect of a semicolon is to reset the hex flag and to set the field width to zero.

The effect of an apostophe is to start a new line, and reset COUNT. TAB(X) may also start a new line, and if so resets count.

However in what to my mind is a bug in Basic, TAB(X,Y) has no effect on COUNT, and so can cause shifted fields. Unless the final item of a print list is a semicolon a new line is started and COUNT is reset to zero on exit from the PRINT statement.

Within a print statement, and also in INPUT statements and with TRACEd line numbers, each character sent to the screen will increment the COUNT.

If COUNT is greater than WIDTH a new line is generated before the character is printed and COUNT is reset to zero.

If WIDTH is set to 255 (the default), COUNT can never exceed WIDTH, and so is never reset.

If WIDTH is set to 40, or a multiple of 40 below 256, then the shifted fields will not occur because COUNT will always be reset to zero before its value overflows the maximum of 255 that can be stored in a single byte of memory.

The way that PRINT statements work can be used to interesting effect if changes in the print control specification are wanted in the middle of a PRINT statement – analogous to PRINT USING in other Basics.

The following short program demonstrates what can be done by changing the format specifications and finally the field width in mid-statement.

Note the effect of the commas and semicolon.

```
   10 A%=10 : @%=10
   20 PRINT FN@(5),A%,FN@(&
20105),A%,FN@(&1020A),A%,FN
@(10),A%
   30 PRINT FN@(5) A% FN@(&
20105) A% FN@(&1020A) A% FN
@(10) A%
   40 PRINT ; FN@(5) A% FN@
(&2050A) A% FN@(&1020A) A%
FN@(10) A%
   50 END
   60 DEF FN@(P%) : @%=P% :
=""
```

– **Mike Stallybrass, Stourport-on-Severn.**

Repeat on tap

I NEED to repeat pages of a letter composed on a BBC B with Computer Concepts' Wordwise using an Epson RX80 F/T.

I have written to Computer Concepts explaining my requirement, but after a month have had no reply.

My need is not catered for in the Wordwise handbook. Hopefully you or one of your readers can tell me how I can make the computer, after completing Wordwise menu option 6, instruct the printer to advance to the top of a new page, re-initiate option 6 and repeat until told to stop. – **H. Oak-Rhind, Chippenham.**

● Your best bet is Paul Beverley's Wordwise Applications Guide, which you can obtain from Norwich Computer Services.

He also has a continuous processing ROM for use with Wordwise.

Lower case shift

I HAVE found a useful technique to change from upper to lower case letters without pressing the Caps Lock button.

To do this you press Shift and then while holding down Shift engage Caps Lock. Let go of both keys.

To produce lower case letters hold down Shift and type. I find this much more convenient than using the Caps Lock key in the conventional way. – **Jeremy Bull, Ashwater.**

Faster screen dump

I AM in the process of writing a program which needs a Mode 2 screen dump, the problem being that a Basic screen dump is so slow.

What I require is a Mode 2 machine code screen dump. Can anyone help? – **I.W. Banister, Isleworth.**

● We published a machine code Mode 2 Epson screen dump in the January 1984 issue of *The Micro User*.

Calling Drive 2

I HAVE a Viglen double sided disc drive and the Computer Users Club disc filing system.

I have loaded Geoff Turner's disc scan program and this works perfectly on Drive 0.

However on a double sided drive it is necessary to be able to use the program on Drive 2, and this I have been unable to do.

*I have altered line 920 to *DRIVE 2 but to no avail. All that happens when Return is pressed is that the message "Channel open at line 1100" appears and the filename of the first file on Drive 0 is shown on the screen.*

Drive 2 remains connected so I cannot understand why the program continues to read from Drive 0.

Please can you tell me how to alter this very useful utility so that a choice of drives is available. – **R.G. Loveday, Woking.**

● Line 120 defines the drive number for the OSWORD &7F control block. So, if in addition to your line 920 modification you change 120 to:

```
LDA #2
```

Drive 2 will be selected instead.

Restricted replication

I HAVE recently bought Intersheet, the new spreadsheet program from Computer Concepts and can report that it is almost superb.

The program is extremely fast and professional except for one rather important area of its operation – the COPY function.

This allows an entry or box within the sheet to be replicated or copied to another area or box.

In most spreadsheets this can be done either "absolutely" or "relatively". In Inter-sheet the ability to replicate "absolutely" is extremely restricted.

A BOX function is provided where the user can elect to retain the original box "absolutely" in the replicated formula, but this does not work within LOOKUP.

Using the BOX function also

→

From Page 191

causes another problem – if you add or delete a column or row within the sheet you must go back and change all the BOX references to the right and below the deleted column or row.

This effectively renders the LOOKUP function in particular almost useless. The user is forced to enter all data referring to the LOOKUP table manually.

I have moaned at Computer Concepts, who are most sympathetic, but think it unlikely that an improved implementation of the program will be forthcoming.

Perhaps I can appeal to any other of your readers who have come up with a similar problem to write to me. Maybe we can get Computer Concepts to change their mind! – **J.R. Quixley, 89 St Andrews Road, Coulsdon, Surrey CR3 3HG.**

Solo on the Costa

WILL you please take pity on a lonely BBC Micro user and ask your readers if there is anybody else on the Costa Del Sol who uses or mis(s)uses the most maddening time waster ever invented by man – or woman, in case a female should perchance to glance.

I have neglected my stamp collecting and oil painting since I bought the wretched instrument of mental torture. I am the only white skinned resident on the coast. – **Jack Bird, 10 Manzana 'A', Pueblo Los Arcos, Elviria, Marbella, Spain S.A.**

Elite dredgers

IN the Elite space trader's flight training manual it describes "Other space types".

I am extremely interested to find out if they really exist, because, having been in many Thargoid destroyed worlds I have never yet seen a "Space Dredger".

Also which is the correct drawing of an Anaconda ship? Is it the one in the space trader's flight manual or the one on the reference card? – **Richard "Dangerous" Clogg, Stanley.**

- We haven't got the answers to your questions, Richard, but you should find plenty of useful information in this month's Guide to Elite.

UDGs up for grabs

*FOLLOWING your reply to Neil Graham in the October Micromail under the heading "Explosion is needed", I must point out that the BBC Micro has a hidden talent allowing up to 128 UDGs to be defined without grabbing any valuable user RAM as it would be exploding the character set via *FX20,n.*

To do this we need to access three locations in page three directly.

The locations required are &36B, &36C and &36D, which are those that hold the location addresses for characters in the range 128 to 223.

Initially they are all set to 12 (&C), which is why these characters usually only give copies of the normal UDGs in the range 224 to 255.

Each address is stored as a page address, so &C indicates page 12, or an address of &C00.

It is therefore a simple matter to put the MSB of the page address at which your character data is stored into these three bytes, and hey presto, 128 UDGs with valid codes from 128 to 255.

For disc users, the simplest way of doing this is to use pages &9 to &B for the extra UDGs, so:

```
?&36b=9:?&36C=10:?&36D=11
```

will give you characters 128 to 159 in page 9, 160 to 191 in page 10, 192 to 223 in page 11, and the normal UDGs (224 to 255) in page 12.

Incidentally, if you want to move the location of the normal UDGs simply put the MSB of the new page required in location &36E.

For example, for two sets of UDGs, let's say in pages 9 and 12, you would use ?&36E=9 to get those stored in page 9 and ?&36E=12 to get at the normal chars.

Now isn't that simpler than using a machine code routine to swap two pages over?

You can also do this trick for the normal character set by altering locations &368, &369 and &36A.

*Changing these, however, has no effect until the characters have been manually redefined via VDU23, and only when the appropriate *FX20 has been issued.*

*To redefine characters 32 to 63 use *FX20,4 followed by ?&368=PAGE DIV 256.*

Don't do it the other way around or you will end up redefining your characters in PAGE+&400.

Having done this you will need to issue 32 VDU23 statements to redefine your characters.

I hope that this will be of some use to Neil Graham and all those other readers who want or need more than 128 UDGs without losing user RAM. – **Mike Kennedy, Managing Director, Unicorn Software, Sleaford.**

Lightning strikes . . .

YOUR Ball Lightning game has me stumped. My version displays the title page and screen 1 correctly, but as soon as the screen is drawn, the message "array at line 1080" appears.

Both I and a colleague believe that my listing is per your article, but are willing to stand correction. Can you help please? – **A. Elliott, Luton.**

- Unfortunately the magazine listing of Ball Lightning is in error, even though our original version, which is identical, runs perfectly.

This may seem strange, but the explanation is as follows.

The error you refer to is caused by a space missing from between the variable *hsd* and the command THEN that must be there for the program to operate correctly.

The only way that this could have been removed in the original program and still have it work perfectly, is if the author used a commercial toolkit to compact it and remove unwanted spaces once he had finished.

This is almost certainly what has happened, and the only person to get an error subsequently would be someone typing in the listing.

Unfortunately it not only affects line 1080, but also several others. The correct versions of the offending lines are shown below.

We apologise for any inconvenience caused by this unfortunate oversight, and must emphasise that if anyone is sending anything in for publication they must not compact it using a commercial toolkit.

Remove any unnecessary spaces using the Delete key by all means, as any mistakes on your part will show up in error messages.

```
  170 IF dead THEN PROCdead ELSE PROC
win
  200 IF dead AND LV%<1 AND SC%>HC%(1
)THENPRINTTAB(5,16)"ENTER YOUR NAME "
;:INPUTHC$(1):HC$(1)=LEFT$(HC$(1),7):
HC%(1)=SC%:PROChsd
  210 IF dead AND LV%<1THENPRINTTAB(9
,28)"Press To Start New Game":S%=GET:
GOTO130
  220 IF win OR (dead=TRUE AND LV%>0)
 THENPRINTTAB(8,28)"Press To Start Ne
w Screen":S%=GET:GOTO140
  270 C1%=32:IF hsd THEN 390
  520 UNTIL dead OR win OR (hsd=TRUE
AND INKEY(-99))
 1080 IF hsd THENPRINTTAB(0,0)"
 ROTCODDAM   LABORATORY'S   ":GOTO113
0
 1700 FORX=0TO2*PI STEP.5
```

Wordwise F-keys

IN the November 1985 issue of The Micro User, *you published a program of mine which can be used to add extra function keys to Wordwise.*

Recently I bought a 6502 second processor and found that the code produced by the program does not work if Wordwise is running over the Tube.

However by adding two or three lines and making a couple of other minor alterations it can be made to work.

I thought therefore that you might be interested in making these alterations to the program

The first few lines of the program should be altered to read:

```
180 MODE 7
185 A%=234:X%=0:Y%=&FF:T%=(
(USR&FFF4) AND &FFFF) DIV &
100
190 IF T%=0 THEN HIMEM=&600
0:code=&1500:move=&A00:newp
age=&1900 ELSE code=&2000:m
ove=&300:newpage=&3000
200 IF PAGE<newpage THEN PR
OCmove_prog(PAGE,newpage)
```

Line 255 detects whether or not the Tube is active, while the next line sets up variables depending on the result.

The call to OSCLI in PROCsave_code should be altered to read:

```
1580 PROCoscli("SAVE "+f$+"
 "+STR$~code+" "+STR$~P%+"
FFFF"+STR$~init+" FFFF"+STR
$~code)
```

The addition of FFFF to the load and exec addresses ensures that the code will run in the I/O processor.

Finally, in PROCmove_code alter the line setting up "length" to:

```
4140 !length=1+TOP-PAGE
```

Note that if the code is it will assemble to a different address.

For some reason, the stand alone BBC Micro is quite happy to have the code running in the upper part of disc workspace but when Tube is active it doesn't like it.

If the program is run in the second processor then the code produced will only work if Wordwise also runs in the second processor. – **Pete Gaunt, London N19.**

More from Solitaire

I THINK that the version of Solitaire listed in your October issue is very good but I wonder how many of your readers wonder if the puzzle is ever solved.

Having proven to myself that there is a solution I have amended and adapted your program listing to offer a third option – a display of the board being cleared.

Here is a listing of the revisions. Where applicable the original line numbers require amending, whereas additional lines can merely be inserted in the original program.

The first three data lines merely require renumbering before adding the additional lines.

On choosing the display option you are given the further option of the program operating automatically or each move being subject to the Spacebar being pressed.

– **John Lambert, Acle.**

```
   1 REM SOLITAIRE AMENDME
NTS
   2 REM By John Lambert
 135 IF op%=51 PROCdemo:MO
DE7:GOTO100
 590 PRINT'CHR$131"OPTION
(2) "CHR$134"An easier vari
ation of the "CHR$134"game,
 can be played by removing
one of"
 615 PRINT'CHR$131"OPTION
(3) "CHR$134"A demonstratio
n of how to  "CHR$134"clear
 the board in Option 1"
 640 UNTIL op%>48 AND op%<
52
 645 IF op%<51 ENDPROC ELS
E CLS:PRINTTAB(3,8)CHR$(141
);CHR$134;"Do you want an a
utomatic display":PRINTTAB(
3,9)CHR$141;CHR$134;"Do you
 want an automatic display"
 646 PRINTTAB(3,11)CHR$141
;CHR$134;"or to press SPACE
 between moves":PRINTTAB(3,
12)CHR$141;CHR$134;"or to p
ress SPACE between moves"
 647 PRINTTAB(10,14)CHR$14
1;CHR$135"(A)uto / (S)pace"
:PRINTTAB(10,15)CHR$141;CHR
$135"(A)uto / (S)pace"
 648 REPEAT: choice=GET
 649 UNTIL choice=65 OR ch
oice=83
 740 RESTORE 1900:MOVE 306
,160
 770 RESTORE 1910:GCOL0,1
 850 VDU5:IF op%=49 OR op%
=51 GCOL0,0:MOVE416,543:PRI
NTHole$
1750 DEFPROCdemo
1760 RESTORE 1930
1770 FOR demoloop=1TO31
1780 IF choice=83:REPEAT:w
ait=GET:UNTIL wait=32
1800 READX1%,Y1%:x1%=X1%:y
1%=Y1%
1810 PROCcursor(2):PROCdel
ay(40):PROCcursor(3)
1820 READX1%,Y1%:x2%=X1%:y
2%=Y1%
1830 PROCcursor(2):PROCdel
ay(40):PROCcursor(3)
1840 PROCcheck:PROCdelay(4
0)
1850 NEXT
1860 VDU4:COLOUR2:PRINTTAB
(6,29)"Press <SPACE> to con
tinue":REPEAT:wait=GET:UNTI
L wait=32
1870 ENDPROC
1900 DATA592,160,800,368,8
00,656,592,866,306,866,96,6
56,96,368,306,160
1910 DATA-1,-1,304,160,592
,160,800,368,800,656,592,86
4,304,864,96,656,96,368,304
,160,-1,-1,984,156,1188,156
,1188,864,984,864,984,156
1920 DATA-1,-1,160,672,288
,672,288,800,160,672,-1,-1,
608,672,736,672,608,800,608
,672,-1,-1,288,224,288,352,
160,352,288,224,-1,-1,608,2
24,736,352,608,352,608,224
1930 DATA224,543,416,543,3
20,351,320,543,512,351,320,
351,320,255,320,447,320,543
,320,351,512,255,320,255
1940 DATA320,255,320,447,3
20,735,320,543,128,639,320,
639,416,639,224,639,128,447
,128,639,128,639,320,639
1950 DATA608,639,416,639,5
12,831,512,639,512,543,512,
735,320,831,512,831,512,831
,512,639,320,543,320,735
1960 DATA320,735,512,735,5
12,735,512,543,512,447,512,
639,704,447,512,447,416,447
,608,447,704,639,704,447
1970 DATA704,447,512,447,4
16,543,416,735,224,447,416,
447,416,447,608,447,608,447
,608,639,608,639,416,639,41
6,735,416,543
```

No loss after all

IF Mr A.J. Spray – "You win but lose" Problem Page, October, cares to write to us we can provide him with the hard and software required to run a teletype without the loss of any of the BBC's facilities.

Another unit covers the newer teleprinters. – **D.B. Driver, R. & D. Electronics, 7 Wimblestone Road, Winscombe, Avon.**

Matter of simple interest

THE October issue of The Micro User *arrived today –*

→

From Page 193

fascinating as usual. Unfortunately there is an error on Page 154 in your answer to "a matter of interest".

Mr M.J. Holmes referred to compound interest. However, your solution – line 170 – uses a conversion for simple interest.

The correct procedure is to convert the yearly rate per cent to a percentage that is divide by 100, add 1, find the 52nd root of the result.

For example assume 7.5 per cent interest a year:

Divide by 100	*0.075*
Add 1	*1.075*
$\sqrt[52]{1.075}$	*1.0013917*

If you multiply 1.0013917 by itself 52 times you get 1.075. So the conversion, in Basic, would be:

```
100 INPUT "What interest
rate ",rate
110 INPUT "Number of weeks
",weeks
170 weekly-rate(1+rate/100)
^(1/52)
180 REM........(1+RATE/100)
^(1/356)
```

Now use weekly rate in the loop. Thanks for a fine magazine. I look forward to it each month – **John H. Holt, Mold.**

● Quite frankly, Mr Holt, we'll take your word for it . . .

Peculiar plot

I AM puzzled by a peculiarity of the PLOT facility which draws dotted lines. The following program will illustrate the query better than I can explain it:

```
  10 MODE 0
  20 FOR N%=5TO21 STEP 16
  30 T%=TIME:CLG
  40 PRINTTAB(37,16);"PLOT
 ";N%
  50 REPEAT
  60 PLOT N%,0,RND(1024)
  70 PLOT N%,RND(1280),102
4
  80 PLOT N%,1280,RND(1024)
  90 PLOT N%,RND(1280),0
 100 UNTIL (TIME-T%)>7000
 110 NEXT
 120 END
```

The question is why the dotted line PLOT code 21 leaves a kite shaped bald patch to the left of the centre of the screen. Why is the display not reasonably symmetrical, as it is with PLOT code 5? – **Colin M. Johnson, Hythe.**

● Very puzzling. Can any of our readers help?

Scanner mod

MANY thanks for Geoff Turner's most useful Disc scanner in the October Micro User.

Owners of the UDM DDFS may be interested in my modification which copes not only with single and double densities, but also with expanded four volume discs.

Lines 460 and 2000-2020 are a worthwhile addition whether or not one uses a DDFS. They allow a clean exit from the

And finally, with tongue firmly in cheek . . .

Last round at the big show

Dear Trev,

Remind me never to go to another BBC Micro Show again. It all started with a letter from the Beeb team. I knew it was from them before I opened it – there was no stamp.

"Dear Wally", it began, "find enclosed two tickets to our Manchester Show. And make sure you bring Andrea – we're expecting a rough crowd".

Despite the fact that they'd forgotten to enclose the tickets I decided to go, though I was a bit wary of taking Andrea after last time. I still break out in a cold sweat when I remember her saying: "So you're Mike Cook. You sound taller in your articles".

However she wasn't going to let me go by myself – I might enjoy myself and get ideas. So with a heavy heart and Andrea, I approached the Renold Building (hereafter known as the Turkish Bath). I must admit though, listening to the crowd thronging towards the show did cheer me up a bit.

"Remember, it's a backup, not a copy", I overheard one doting parent advise his offspring.

At the door I showed the letter and asked directions to the technical advice stand.

"Follow the empty beer cans", came the reply. I must remember that for my next adventure game, because I found the Beeb team in next to no time. Mind you I think the sounds of raucous laughter and the people fleeing with looks of horror on their faces gave me other clues.

"Hey lads, it's Wally", cried one of the team, hanging onto a micro for support. "You've come just in time – they're open".

"What's this about a rough crowd?" I asked, "they all look very nice to me".

"Not them you fool, we meant the people in technical advice", snarled a Mike Bibby look-alike. I later learnt that he was the editor's twin brother – "he's a backup, not a copy".

At that moment a young lady approached the stand. Sexist beasts would describe her, no doubt, as a right little raver but I'm more liberated than that. I just drooled.

"Down Pavlov", warned Andrea in her best Barbara Woodhouse voice (marginally preferable to her best Barbara Cartland).

"Can I speak to the editor?" the vision asked as a thousand ships were launched on the Irwell.

Like magic both the editor and clone appeared and entered into a dispute.

"I'm the editor", cried one.

"No he's not, I am".

"Not".

"Am".

"Well, whichever one is", the angel replied, suddenly turning into something that makes A. look like Mother Teresa, "why don't any of your programs ever work?"

The result was amazing.

"He's the editor".

"Oh no I'm not, you are".

At this point I noticed a wizened looking little old man in the corner of the stand.

"Hello cobber", he wheezed in a cockney accent. "I'm Bruce Brown from Nut Cracker".

"Sweet", A. got in before I could stop her.

I was intrigued. What had lured the top writer for the magazine for squirrels from his haven in the quiche belt south of Watford?

"The beer", he replied to my unspoken question. And that was the magic word. Suddenly the technical advice stand was abandoned as the whole Beeb team hurtled off to the local pub. This venerable institution was called the Glass of Lowrie (apparently in honour of a local artist).

"Your round Wally", they said shoving me to the front of the bar. As I paid the smiling landlord for the double round ("Get two, it'll save time later") I asked him about the beer.

"Who brews this?" I asked, "I've never heard of it".

"We do", he replied proudly, "but I don't think we can do it fast enough", as he saw the team with empty glasses.

"Should you really drink so much if you're giving advice this afternoon?" asked a disapproving A.

"To give the sort of advice we do, we have to".

And here once again I will draw a veil over the rest of the proceedings. Why should I mention the poor brute who kept running round going "I'm so happy, so happy"? It later turned out he was the ex-editor of Electron User who'd had his Beeb restored to him for good behaviour.

Why should I tell the tale of Bruce's theft of the remains of Mike Cook's pint? Nor of his later panic until we'd explained that Aids was a software tool.

Eventually the session ended with the landlord crying: "Last orders, last orders". However as he passed our table he changed the cry to: "First orders, first orders".

"Why's he saying that?" I asked stupidly.

"It opens again in a couple of hours".

I can't wait for next year, Cheers,

Bob

program at any time by pressing escape. – **David Hoskin, Driffield.**

```
  320 LDA&81
  411 .volume
  413 LDX#&10
  415 LDY#&40
  417 JSR &FFF7
  419 RTS
  460 ON ERROR IF ERR=17 TH
EN 2000 ELSE REPORT:END
  561 PRINTTAB(7,5);"DENSIT
Y? ";
  563 REPEAT:G$=GET$:UNTIL
G$="S" OR G$="D":PRINT G$;
  565 IF G$="S" ?&81=&7F:?&
78=0:GOTO 622
  567 ?&81=&72:?&78=16:PRIN
T"  :  MULTI-VOLUME? ";
  569 REPEAT:G$=GET$:UNTIL
G$="Y" OR G$="N":PRINT G$;
  622 IF G$="Y" PROCmulti E
LSE PROCmain
  624 GOTO 850
  626 DEFPROCmain
  628 *ACCESS *.*
  705 dir=ASC(LEFT$(F$,1))
  707 IF dir=0 OR dir=38 OR
 dir=64 THEN dir=0:GOTO 820
  720 PRINTTAB(4,23);SPC32;
  730 PRINTTAB(4,24);SPC32;
  830 UNTIL dir=0
  832 *ACCESS *.* L
  835 ENDPROC
 1350 PRINTTAB(4,23);SPC32;
 1360 PRINTTAB(4,24);SPC32;
 1470 DEFPROCmulti
 1480 FOR I=0 TO 3
 1490 VDU26
 1500 PRINTTAB(36,23);"V.";
CHR$(65+I);
 1510 PRINTTAB(36,24);"V.";
CHR$(65+I);
 1520 VDU28,0,21,39,3
 1530 $&4010="VOL.0 "+CHR$(
65+I)
 1540 CALL volume
 1550 PROCmain
 1560 NEXT I
 1570 *VOL.0 A
 1580 ENDPROC
 2000 CLOSE#0
 2010 *ACCESS *.* L
 2020 END
```

Bugged

IN Alan McLachlan's article, "Making more of Smileys", in your September edition he rather foolishly throws out a challenge when suggesting that his program contained in that article is bug-free.

There is in fact one bug in the program. When the final Smiley is found after x attempts the result is shown as x+1 guesses.

This is simply remedied by amending line 850 to read:

```
PRINT TAB(0,9);"That took
";turns-1;"guesses"
```

Happy programming. – **F.C. Kennedy, Leeds.**

● You may recall that in his article Al said that he was devious enough to have put a bug in deliberately.

However he is also an honest sort of chap, and confesses that he missed this one.

Royal salute

I AM writing an educational program which requires a fanfare of trumpets.

I have searched all my back copies of The Micro User *and* Electron User *and various computer books and though I have experimented myself I cannot produce an envelope that produces the right sound.*

There was a fanfare envelope in Electron User *but it was not what I wanted.*

To give you an idea, I'm trying to get something like the fanfare played when the Queen attends special banquets or other occasions. Can anyone help me? – **Kevin Finn, Sale.**

DFS in duplicate

I WISH to buy a ROM expansion board that will allow me to install two DFSs.

Are there any boards that will allow me to do this, and if so where I may get hold of one? – **P. Littlewood, Huddersfield.**

● Mike Mahon did a comprehensive survey of most of the available expansion boards and we published it in the July 1985 issue of *The Micro User*.

The Advanced Disc Toolkit from ACP, which is currently being reviewed, has an UNPLUG command to enable/disable certain sideways ROMs. Having UNPLUGged a DFS it stays out even after a Ctrl+Brk.

You'll probably need this when you have two DFSs, when you wish to switch between them.

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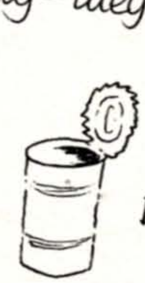
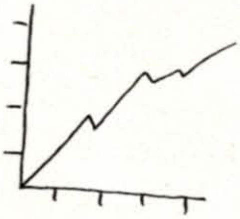


DO



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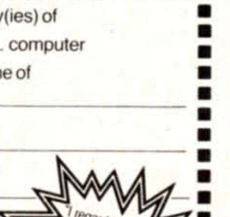
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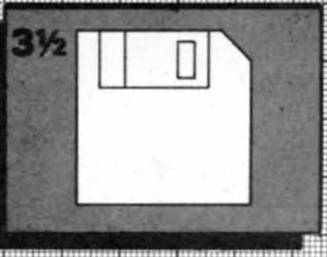

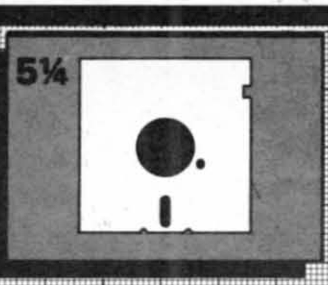

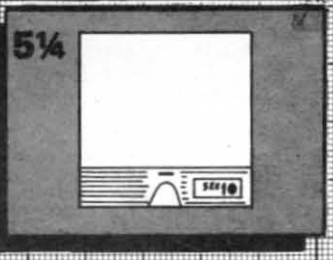

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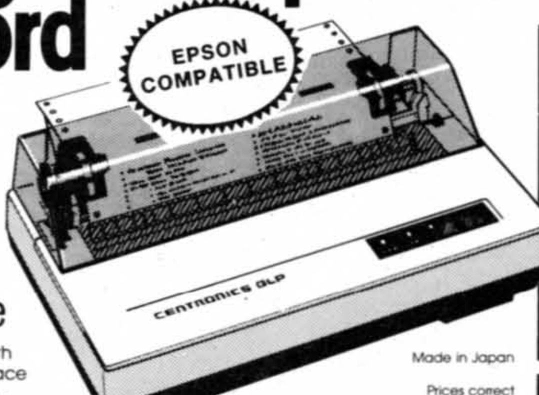

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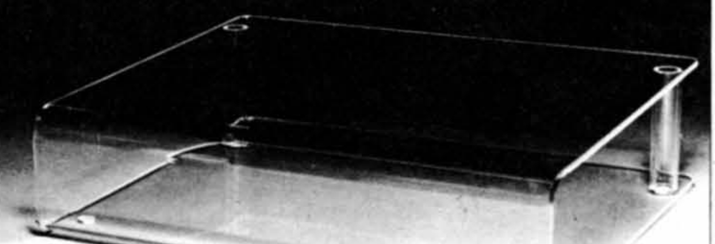

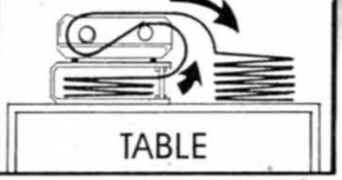

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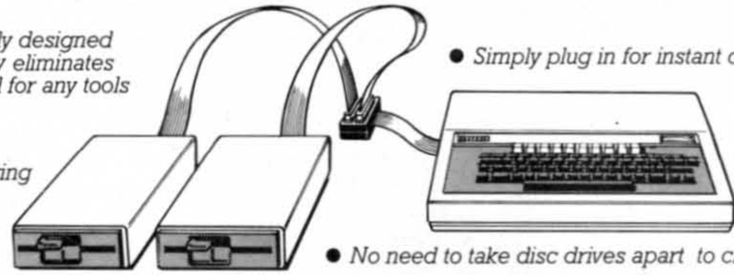

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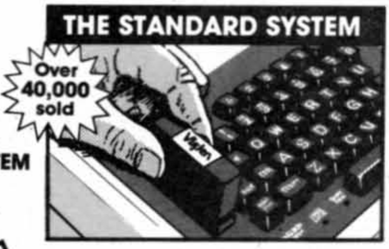
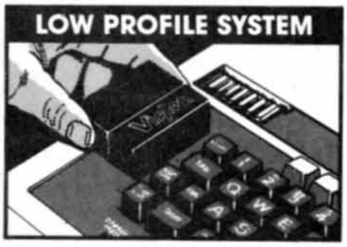


The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

LOW PROFILE SYSTEM



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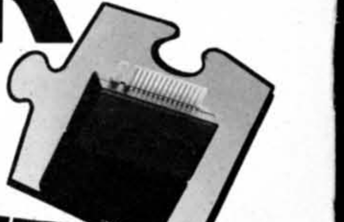

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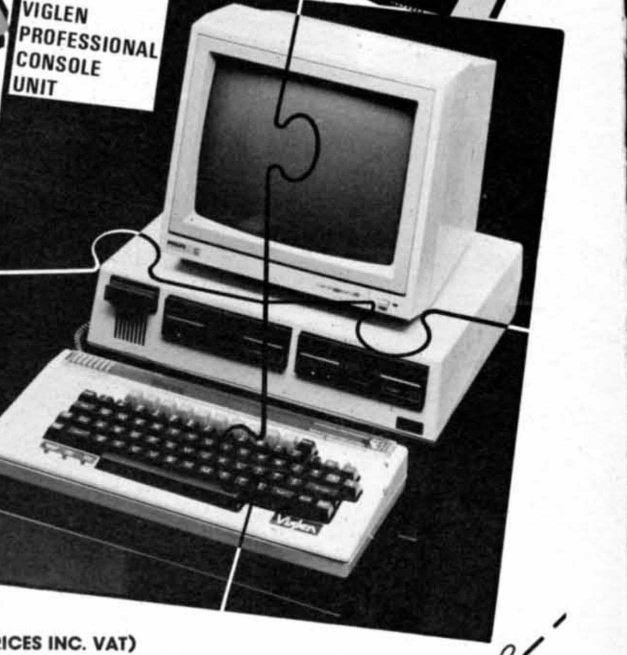

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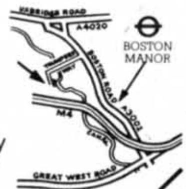

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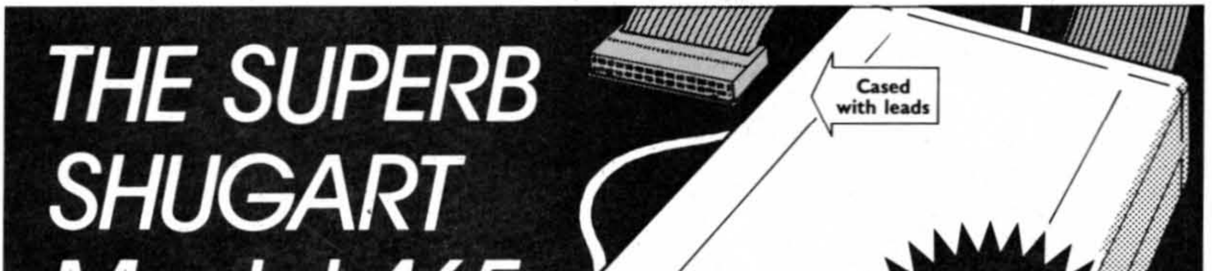

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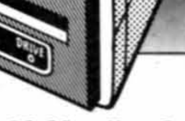

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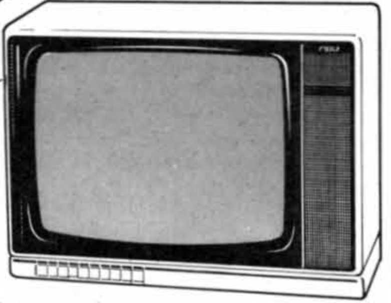

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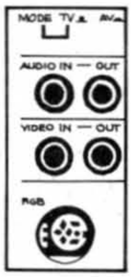

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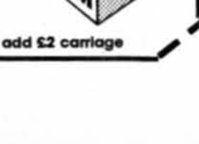

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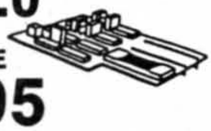

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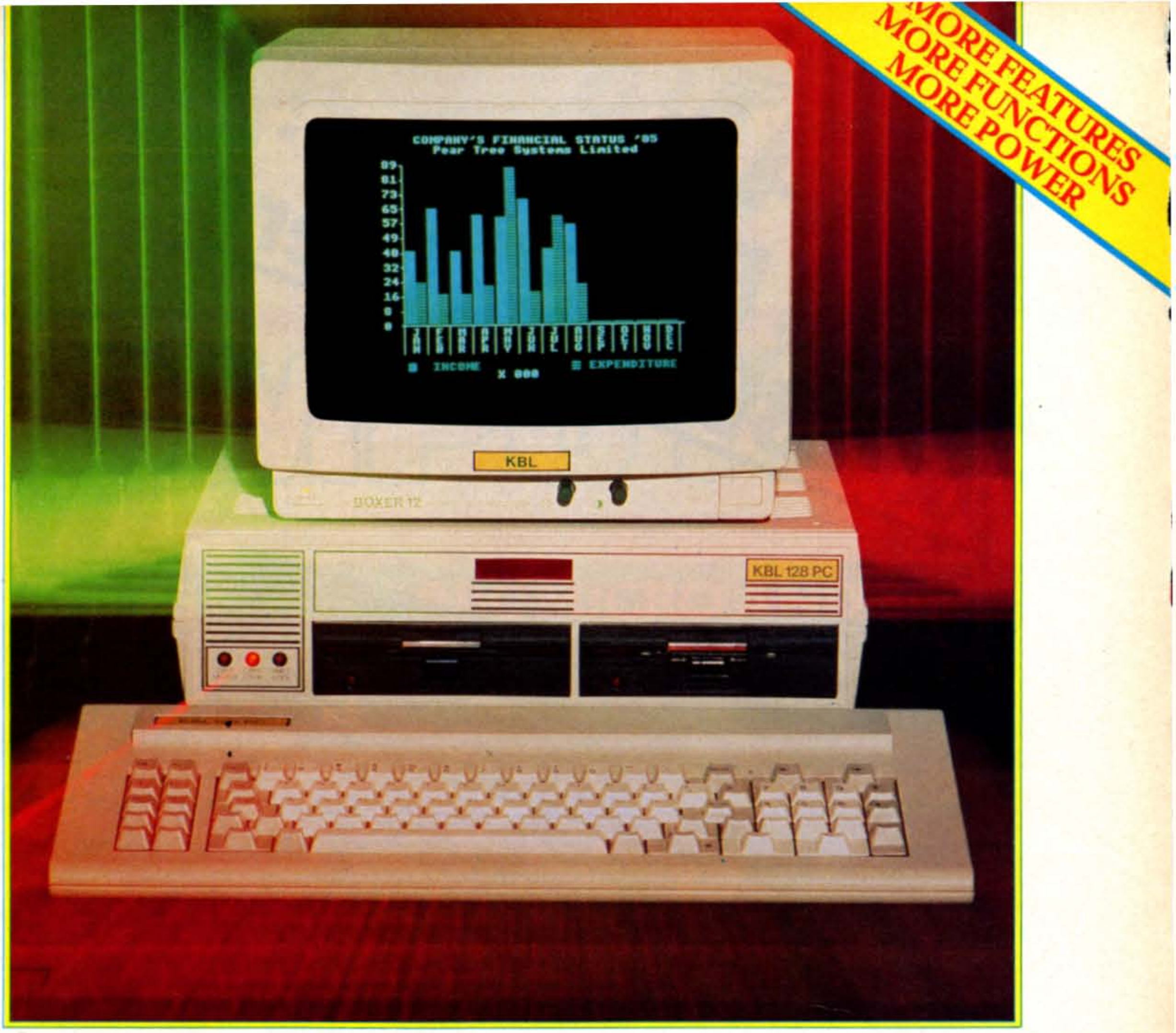
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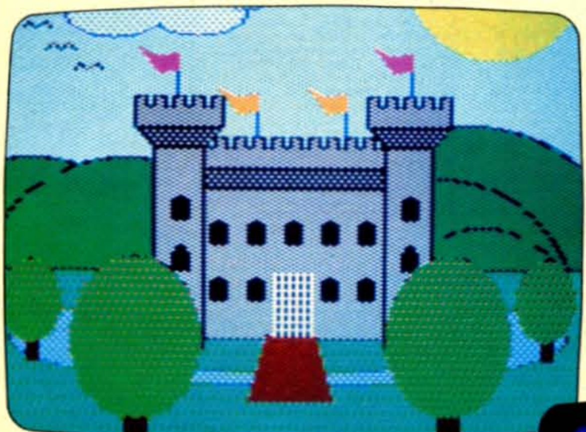

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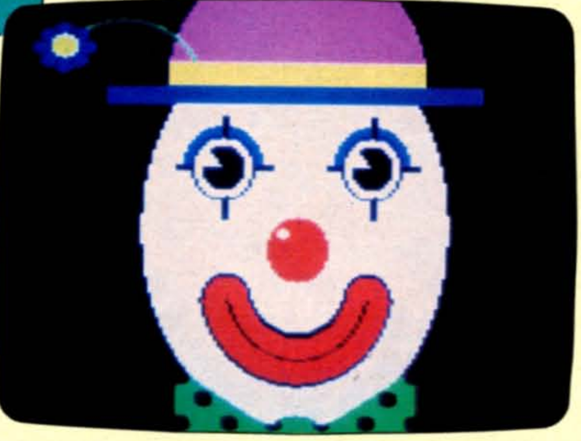

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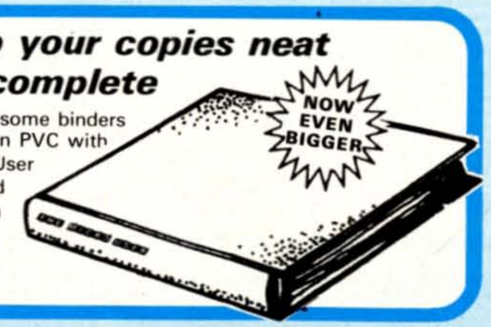

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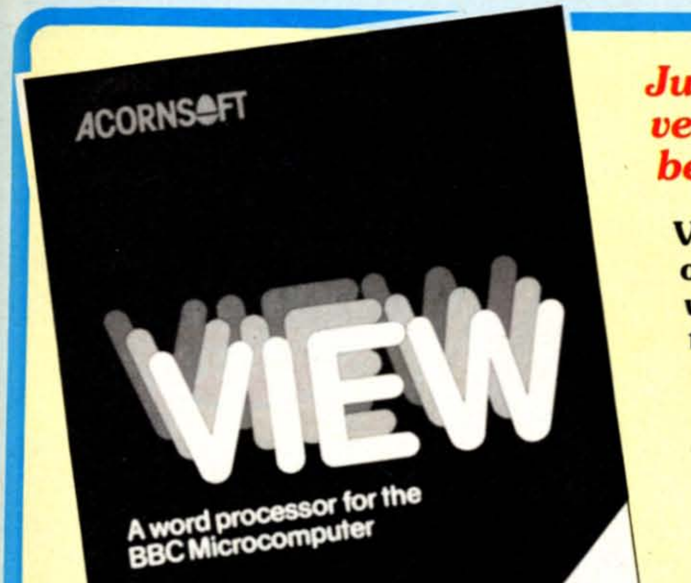
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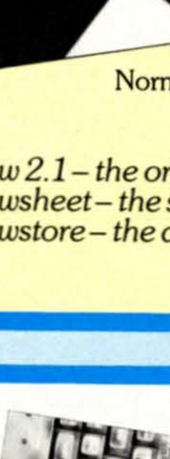
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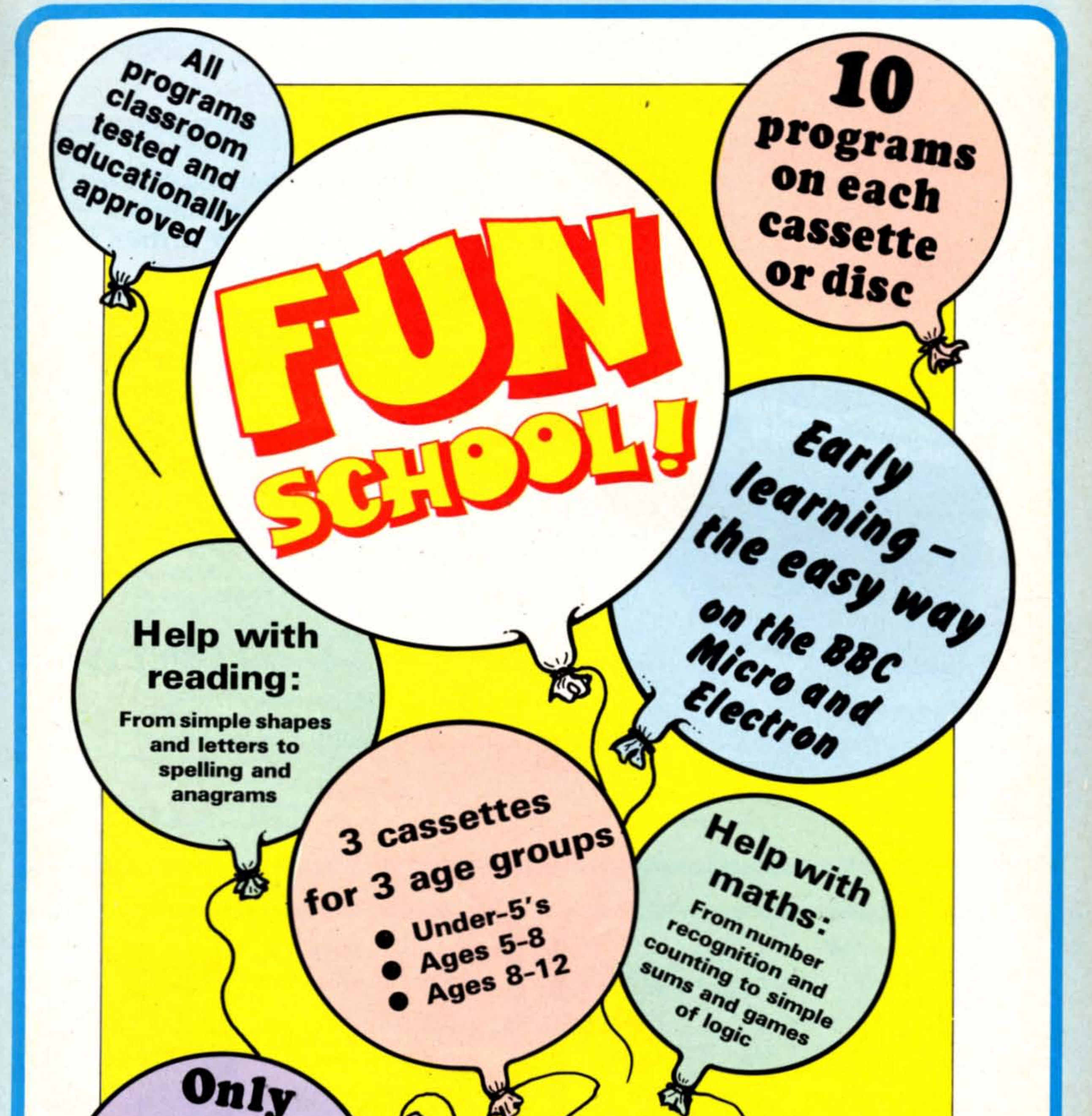
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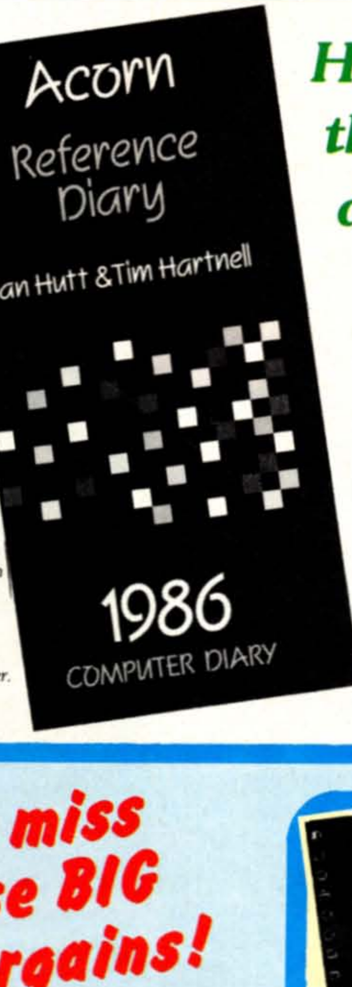

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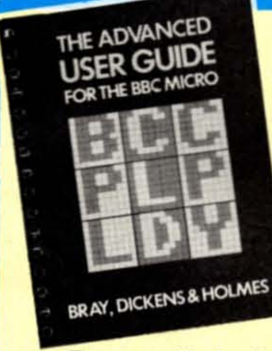

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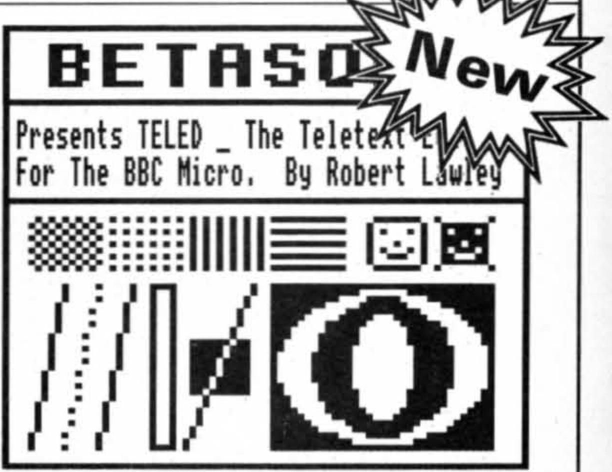

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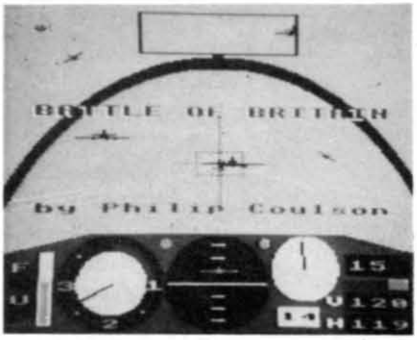

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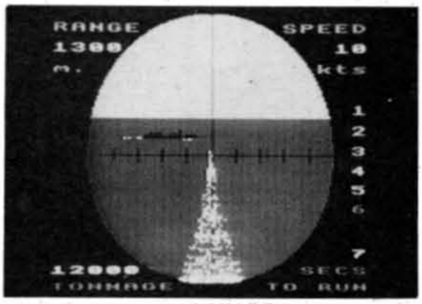

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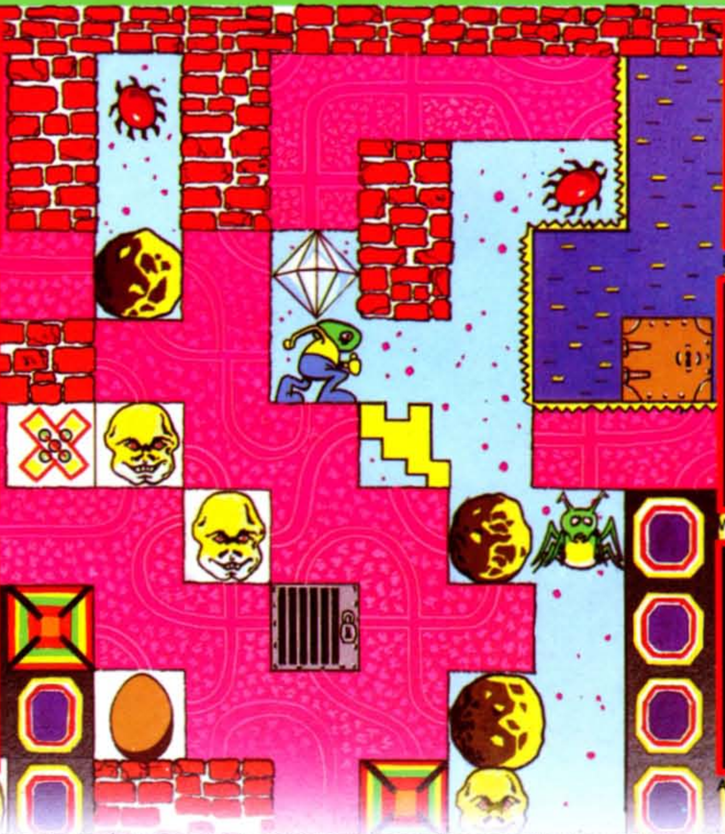

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